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WHITE OR PAPER BIRCH

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IT IS A VOLUNTARY organization for the inculcation and spread of a forest policy on a scale adequate for our economic needs, and any person is eligible for membership.

IT IS INDEPENDENT, has no official connection with any Federal or State department or policy, and is devoted to a public service conducive to national prosperity.

IT ASSERTS THAT forestry means the propagation and care of forests for the production of timber as a crop; protection of watersheds; utilization of non-agricultural soil; use of forests for public recreation.

IT DECLARES THAT FORESTRY is of immense importance to the people; that the census of 1913 shows our forests annually supply over one and a quarter billion dollars' worth of products; employ 735,000 people; pay \$367,000,000 in wages; cover 550,000,000 acres unsuited for agriculture; regulate the distribution of water; prevent erosion of lands; and are essential to the beauty of the country and the health of the nation.

IT RECOGNIZES THAT forestry is an industry limited by economic conditions; that private owners should be aided and encouraged by investigations, demonstrations, and educational work, since they cannot be expected to practice forestry at a financial loss; that Federal and State governments should undertake scientific forestry upon national and State forest reserves for the benefit of the public.

IT WILL DEVOTE its influence and educational facilities to the development of public thought and knowledge along these practical lines.

It Will Support These Policies

National and State Forests under Federal and State Ownership, administration and management respectively; adequate appropriations for their care and management; Federal cooperation with the States, especially in forest fire protection.

State Activity by acquirement of forest lands; organization for fire protection; encouragement of forest planting by communal and private owners, non-political departmentally independent forest organization, with liberal appropriations for these purposes.

Forest Fire Protection by Federal, State and fire protective agencies, and its encouragement and extension, individually and by cooperation; without adequate fire protection all other measures for forest crop production will fail.

Forest Planting by Federal and State governments and long-lived corporations and acquirement of waste lands for this purpose; and also planting by private owners, where profitable, and encouragement of natural regeneration.

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Equal Protection to the lumber industry and to public interests in legislation affecting private timberland operations, recognizing that lumbering is as legitimate and necessary as the forests themselves.

Classification by experts of lands best suited for farming and those best suited for forestry; and liberal national and State appropriations for this work.

AMERICAN FORESTRY

The Magazine of the American Forestry Association

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April, 1916. Vol. 22

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American Forestry

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No. 268

The Birches

By SAMUEL B. DETWILER

"The birch, most shy and ladylike of trees."—Lowell.

THE birches are among the most graceful of our trees. At all seasons they possess a quiet charm that seldom fails to win the admiration of the lover of nature. Besides being highly prized for ornamental purposes, several kinds furnish wood valuable for lumber and many other uses. Birch bark supplies a fragrant oil employed by the Russians in tanning leather; the oil is also used for medicinal purposes and flavoring. Birch beer, made from the sweet sap of some species, is a palatable drink. Thick sheets of birch bark served the Indians for canoes, shoes, boxes and coverings for their lodges. The bark burns readily, and is used by the woodsman to start camp fires, and for torches. Thin layers of bark are sometimes used for paper; twenty-three hundred years ago the books of Numa Pompilius are said to have been written on birch bark.

Superstitious persons in times past have relied on the powers of the birch tree to guard them from lightning, wounds, gout, caterpillars and "the evil eye." Many a country schoolboy who has been commissioned to a cut a switch for his own punishment "from that sour tree of knowledge—now a birch," may not have appreciated the fact that this is a time-honored use of this tree. There is a legend that one dwarf variety never regained its size after Christ was beaten with sticks which it furnished. The Russian believes the birch tree to be a symbol of good health, and in taking a sweat bath, he is flogged with birch switches until he perspires.

The birches, except one South American species, are inhabitants of cool, northern regions and several kinds, as shrubs, reach the borders of the Arctic Circle. About thirty-five species are found in various parts of the world, and fifteen are

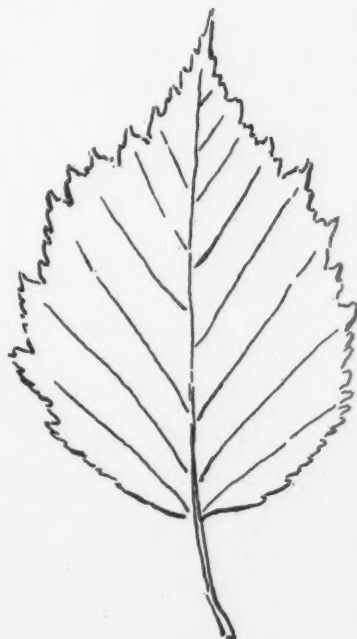
native to North America. Of the latter, nine develop into trees and six grow only as shrubs.

Paper birch (*Betula papyrifera*), often called canoe birch, white birch or silver birch, is usually less than 75 feet high and 18 inches in diameter. It is one of the few trees of our country that grows from coast to coast. Botanists distinguish several forms of this species; one variety or another is found from Labrador to Alaska and south to Pennsylvania, Michigan, Colorado and Washington. It grows on moist slopes, and bordering lakes and streams. When not crowded, it has an open, irregular, rounded head, but in the forest the top is small and the stems straight and clear. The surface of the bark is chalky-white and can be separated into parchment-like sheets. The inner bark

is darker, usually a cinnamon color when fresh, but blackened after long exposure. The white outer bark, once removed, never forms again, and the beauty of the tree is marred; if a thick layer of bark is peeled, exposing the sapwood, the tree dies. Because of its thin bark, paper birch is very easily killed by fire.

The paper birch is the "glad" tree of the northern woods because it brightens and brings cheer to the dark places of the forest. Wherever it grows it adds the crowning touch of beauty. Its white bark gleams in striking contrast against a background of evergreens, but to learn the magic spell of this tree one must go deep into the woods and watch the wonderful play of light and shadow as the sunlight of a clear summer day ripples through the foliage.

The scientific name of white birch (*Betula populifolia*) means the poplar-leaved birch; this name is given because its leaves continually flutter in the slightest breeze, like those of the poplars. It is called old



WHITE BIRCH LEAF

The leaves of all species of birch are very much alike. They occur singly or in pairs, but never stand opposite each other. They are like an arrow head in shape and have saw-toothed edges.

field or poverty birch because it so quickly takes possession of abandoned fields in New England. Gray birch is also a common name, derived from the color of the outer bark, which has a grayish cast—a much duller white than that of paper birch. It cannot be peeled off in papery layers. Beneath each side branch is a V-shaped black blotch. The twigs are more slender and droop even more gracefully than those of paper birch; they are also much more noticeably roughened by resinous dots on the surface of the bark.

White birch is always a small tree, seldom reaching a greater size than 25 to 40 feet in height, and a foot in diameter. It grows from Nova Scotia to the southern shores of Lake Ontario, and south to Delaware, principally along the coast. It is found most frequently on dry, gravelly soils, but occasionally in moist ground. It is a sun-loving, vagabond tree, quickly taking possession of burned forest areas or abandoned fields, but is short-lived and unable to compete with other trees that spring up in its grateful shade.

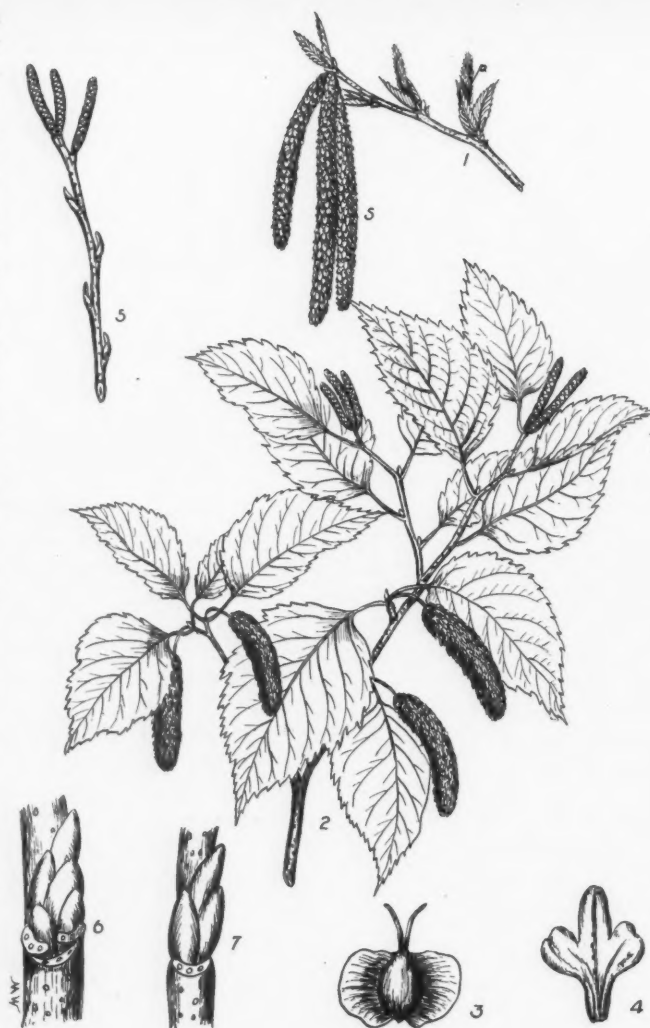
The European white birch (*Betula alba*) is often planted for ornament and is the only other tree that is liable to be mistaken for either white or paper birch. It is so closely related to paper birch that the latter is generally considered a botanical variety of the European species. A very common form has "weeping branches," another has finely divided "cut" leaves. The bark at the base of large trunks has deep, dark-colored furrows. The outer bark has the chalky whiteness of paper birch, but does not so readily separate into thin layers.

Sweet birch (*Betula lenta*) is also known as black or red birch, cherry birch and mahogany birch. It ranges from Newfoundland to northwestern Ontario, southward to southern Illinois and along the Allegheny Mountains to western Florida. Its average size is 50 to 60 feet

high and 1 to 3 feet in diameter, but it occasionally grows 80 feet high and 5 feet through. Old trees with plenty of space for growth develop handsome, spreading tops, with heavy, twisted branches and an abundance of slender, pliable twigs. In the forest, mature trees have clear and fairly straight trunks and rounded, rather broad and heavy-branched tops. Young trunks and branches have smooth, shining bark of a dark reddish-brown color, looking much like the bark of the common sweet cherry. Old trunks are covered with large, thick, irregular plates of bark, the edges of which curl stiffly back. The bark does not peel in papery layers, but is smooth on the surface between the furrows and is dark brown, almost black, in color. The inner bark gives the best clue by which to identify sweet birch. It has a fragrant odor and a strong flavor of wintergreen. Indeed, sweet birch bark formerly produced most of the commercial oil of wintergreen. The pleasant-tasting bark is not the only delightful tid-

bit this tree supplies to the woodsman. The sap is sweet and inviting, either in its natural state or when brewed. Strips of inner bark, dried in the spring when it is rich in starch and sugar, have been used for food.

Yellow birch (*Betula lutea*) is an important timber tree of the northern forests. It grows on rich, moist, well-drained soil from Newfoundland to southwestern Ontario and northern Minnesota south to Delaware, and in the Appalachian Mountains to North Carolina and eastern Tennessee. Its ordinary size is 60 to 80 feet in height, and 2 to 3 feet in diameter. In form it closely resembles the sweet birch, but tends to have a more spreading habit. Its bark has a distinct dingy yellow color and the outer portion can be pulled away in thin, filmy ribbons. Young trees have smooth, glistening, silvery bark, and for this reason the tree is called by some



WHITE OR PAPER BIRCH

1. Flowering branch with immature leaves, (s) staminate flowers, (p) pistillate flowers; one-half size.
2. Branch with mature leaves, fruiting strobiles and partly developed staminate aments; one-half size.
3. A winged seed.
4. A strobile scale, enlarged.
5. A winter branch.
6. Section of lateral winter spur-branch, enlarged.
7. Section of a terminal winter branch, enlarged.



AREA OF BIRCH GROWTH

the silver birch. A little later in life the bark becomes tinged with yellow and the surface is broken in long lines and rolls back in a ragged fringe. Large trunks, especially near the base, lose most of the tattered silvery-yellow bark, becoming dark gray or reddish, and roughened by deep, irregular furrows and thick plates. The bark of the twigs has a slight wintergreen odor and a bitter taste. The bark burns very readily when dry and is often used for starting camp fires. Dead yellow birch trees are a danger in case of forest fires, because the fire flashes along the shaggy bark to the top of old stubs, and if a high wind is blowing, pieces of flaming bark are carried long distances ahead of the fire to start a new blaze.

River birch (*Betula nigra*), frequently called red, blue, black or water birch, is a medium-sized tree, 30 to 50 feet high and 1 to 2 feet in diameter, but occasionally reaching a height of 100 feet and a diameter of 5 feet. As its name indicates, it is found along streams and on other moist soils. Nature uses this tree as a dyke-builder, as the matted roots hold the soil deposited along stream banks by floods. It is sometimes planted to prevent stream banks from washing away.

River birch is native from Massachusetts to Florida and west to Minnesota, Kansas and Texas. The bark is even more ragged than yellow birch, and, like the latter, the outer layers peel off in lustrous, silky scales. The delicate pink-brown or chocolate color of the bark separates it easily from all other birches. The twigs are red and shining, and are especially graceful as they droop beneath the heavy masses of dark green foliage.

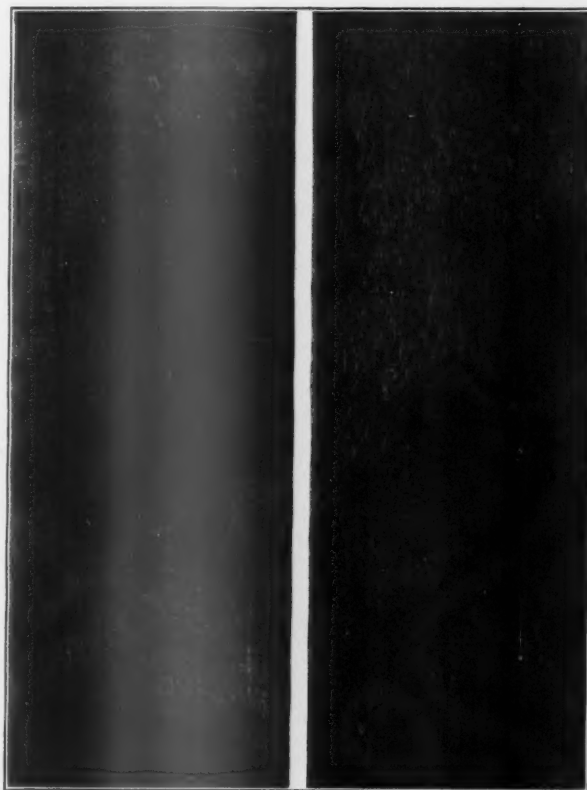
Western birch (*Betula occidentalis*) is a tree 100 to 120 feet high, 3 or 4 feet in diameter, that grows very sparingly in northwestern Washington and southwestern British Columbia.

Kenai birch (*Betula kenaica*) is a small tree found only on the coast of Alaska.

Mountain birch (*Betula fontinalis*), as its name implies, is a mountain species. It is a small tree, or more often a shrub, growing from British Columbia to Colorado and west to the Sierra Nevada Mountains of central California.

Alaskan white birch (*Betula alaskana*) is also a small-sized tree. It resembles paper birch and in portions of Alaska it is quite abundant on sunny slopes. It grows from the Saskatchewan valley to the valley of the Yukon River.

The different species of birch have a number of points in common. The bark has peculiar horizontal markings due to the lengthening of the breathing pores as the tree grows in diameter. The buds are small, pointed, and covered by overlapping scales of various shades of brown. They stand singly and have an alternate arrangement on the stem. The leaves of all species are very much alike in appearance and occur singly or in pairs, but never stand opposite each other. They resemble an



WHITE OR PAPER BIRCH

Tangential or bastard cut, the common method of sawing this species of wood.

Radial cut (quarter sawn). The pitch rays are quite inconspicuous in the wood because of their small size.

arrowhead in shape and have saw-toothed edges. The pollen-producing and seed-forming flowers are borne on different parts of the same tree. They appear in early spring before or with the leaves. The pollen-producing flowers are long, tassel-like bodies with a yellow or brown tinge, and hang down from the ends of the twigs. The greenish seed-forming flowers appear below those that produce the pollen and are rather small and slender, standing nearly erect. The fruit is a narrow cone-like structure one-half to three inches long. The scales which compose the fruit bear tiny, flattened chestnut-brown nuts. These nuts are provided with two small,

thin wings, by means of which they travel long distances through the air.

Paper birch and white birch have especially light seeds and for this reason are among the first trees to come up where forest fires have killed the vegetation. The natural germinating bed for seeds of sweet and yellow birch is the ground of an old forest where there is plenty of shade and moss. Where birch trees grow near streams, great quantities of seed are carried by the water to points remote from the parent trees. The birches bear seed in abundance, but the seeds must be kept moist after they fall or they lose their vitality. River birch ripens its fruit about June; the other species ripen and scatter their seeds in the autumn.

In mid-summer it is not unusual to find the ground near river birch-seed trees entirely carpeted with birch seedlings 2 or 3 inches high. Near a group of river birches growing in the Mississippi River bottomlands in Wisconsin, 19,790 birch seedlings, three months old, were counted on a plot 6.6 feet square. At this rate nearly 20,000,000 seedlings were growing on a single acre. Another plot measured in a nearby thicket of 3-

year-old seedlings, 2 to 4 feet high, proved that 137,000 seedlings of this size would grow on an acre. In a similar birch thicket where the trees were about 17 years old, 3,270 trees were still living in spite of their fierce fight with each other for the soil and sunlight necessary for their growth. They ranged in height from 25 to 50 feet. The majority were only 1 to 3 inches in diameter, although a few measured 5 inches. Properly thinned, according to the principles of forestry, this stand of 17-year-old trees contained only 660 trees per acre. It was found that such thinning more than doubled the rate of diameter growth of the trees that were left.

All kinds of birches grow rather slowly, but rank high for planting for ornamental purposes. The best for this use are paper birch, European white birch, sweet birch and river birch. They have a finely divided, spreading-root system that makes them easy to transplant. All grow best in rich, well-drained soil, but do well in dry, sandy land. River, yellow and sweet birches can be planted successfully in rather moist locations. The white birches are comparatively short-lived, especially when growing in dry soils, and are frequently subject to attacks from bark and wood borers.

The Products and Uses of Birch¹

THE birches hold an important place in the list of American timber trees. Sweet birch and yellow birch are by far the most valuable, but the paper, gray, and river birches have a variety of practical uses. The species found in the western part of North America are too small or of too scattered growth to be commercially important. The wood of all birches is heavy, hard, strong and of fine texture. The sap wood is white; the heartwood has a pleasing brown color tinged with red or yellow. The wood shrinks considerably in drying and is not durable when exposed to the weather. However, it works well, and because of its beautiful satiny luster it is exceedingly handsome when polished.

Sweet birch lumber is produced in commercial quantities in all of the States east of the Mississippi River except Illinois and the Gulf States. It nowhere forms extensive stands but is found mixed with other hardwoods. Because of its valuable qualities, the supply of sweet birch is being steadily diminished. In the early settlement of the country the fertile tracts where some of the finest sweet birch grew were cleared for farms and the logs were burned. Birch is an ideal firewood and large quantities were used for fuel from Maine to Michigan, before the value of the wood was realized. During the past thirty or forty years the sawmills have been cutting sweet birch and what now is left is a mere remnant of the former supply.

The wood of sweet birch is stiff and strong and the principal objection to its use arose through the diffi-

culty which was experienced in seasoning the lumber, since it warped badly. Probably the most important use for birch lumber at the present day is for various kinds of furniture. The advantages of the wood for this purpose are that it is dense and even-grained, has good milling qualities, and will take and hold almost any kind of finish. Boston furniture makers very early discovered that sweet birch wood could be treated so as to imitate mahogany in appearance. It can also be treated so that it closely resembles cherry. The dark red heartwood is so beautiful that today it is not necessary to sell it under a false name, although this is often done. As a furniture wood, chairs of all descriptions consume the largest quantity of sweet birch lumber. Desks, church fittings, tables, cupboards, bookcases and filing cabinets are a few of the important articles of furniture made wholly or in part of this lumber.

The beauty of sweet birch has caused it to be selected for the outside wood of many musical instruments. Its hardness and strength make it valuable for piano hammers, the framework of pianos, and pipes for organs. Almost every kind of musical instrument in which wood is used has drawn upon sweet birch for material. This wood holds quite an important place as a vehicle wood. It is sometimes used in the bodies of automobiles and fine carriages, and also in other parts of automobiles, such as seat frames, floors, dash boards, steering wheels and spokes. Although used for the hubs of light carts and buggies, it is not so good as elm and oak for this

¹The information contained in this article is drawn largely from Bul. 12, U. S. Dept. of Agriculture.

purpose. Birch is also employed to a considerable extent for panelling in railway cars.

The wood of sweet birch makes a handsome and durable floor, if it is thoroughly seasoned when laid. It is a choice lumber for finishing the interior of high-class dwellings. Such use includes ornamental columns, newel posts, stair rails and spindles, moldings, mantels, window and door frames. Doors made of sweet birch are especially attractive. Wood with a curly or wavy grain is often used in this class of work. Much sweet birch lumber is also used for ceiling and wainscoting. It is a favorite wood for finishing and fixtures in offices, stores, banks, bars and hotels.

In the manufacture of artists' materials this wood is selected for easels, rules, palettes and panels for oil painting. Considerable birch is used in the finish of high-



BIRCH PRODUCTS

The annual consumption of yellow and sweet birch by the furniture industry amounts to over 50,000,000 feet. This material is purchased in the form of lumber and dimension squares and is used for all types of both house and office furniture. Birch when properly finished makes a splendid imitation for mahogany, and is often treated in this way.



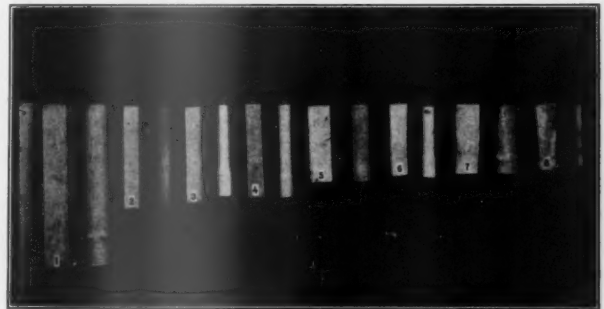
ALL THESE ARE MADE OF BIRCH

Birch is highly prized as raw material for novelty turnings. One factory alone manufactures nearly 1,000 different articles. The photograph shows turned boxes, buttons, spools, shoe tree plugs, etc., made from paper birch.

class canoes, motor boats and yachts. It is a favorite for billiard tables and cues and even billiard balls. Dumbbells, Indian clubs, croquet mallets and balls, and building blocks, and similar articles are mostly made of birch. Since the European war the demand for gunstocks has been so heavy that this wood has been extensively substituted for walnut. It also enters into the manufacture of agricultural implements, broom and brush handles, tackle blocks, picture frames, tripods, instruments and tools. It is used to some extent in slack barrels, woodenware, coffins and work benches. A long list of other uses might be mentioned.

Yellow birch is not so widely distributed in the United States as the sweet birch, but in New York and the

Lake States it is a highly important lumber-producing tree. As a furniture wood it is not considered the equal of sweet birch, but cannot be easily distinguished and is much used. The natural grain of the wood, when finished, is not as soft and lustrous as that of sweet birch, but the furniture made from it is handsome, strong and substantial. It is used both as an outside and inside wood in the manufacture of desks, tables, stands, chairs, benches, filing cabinets, and fixtures for stores, offices, banks and bars. In the manufacture of vehicles yellow birch is well fitted for certain uses because it is hard, strong and stiff, and is employed in much the same manner as sweet birch. It enters to a large extent into the manufacture of wooden dishes and handles of many kinds; also pill boxes, school supplies and other novelties. The miscellaneous uses of yellow birch range from grain doors down to toothpicks. For most purposes either the sweet birch or the paper birch is preferred to yellow birch, but wherever the latter is used it gives good satisfaction because it is one of the stiffest and strongest woods obtainable.



BIRCH IS HIGHLY PRIZED AS A TURNING WOOD

For this reason it is extensively employed in the manufacture of twisters, speeders and bobbins for use in textile mills. The photograph shows various styles of these articles in the rough and the squares from which they are made.

Yellow birch and sweet birch, with beech, furnish 90 per cent of all the hardwood used in destructive distillation in the United States. Mill waste and cordwood from material that remains in the woods after logging are carried to large plants, where the wood is heated to a high temperature in retorts. Wood alcohol and acetic acid are driven off in gaseous form by the heat, and the vapors are then condensed and purified. The

heavy and hard to handle on account of the sap, but when dry it becomes fairly light in weight. The wood rots very quickly in contact with the ground. The bark is durable, because the oil it contains keeps out moisture and prevents rapid decay. The appearance of the bark often gives a clue to the quality of the wood. Trees with dark-colored, close bark are apt to have tough, stringy wood, while those with chalky-white, papery bark generally have smooth, easily worked wood. Its even grain and smooth, clean surface when worked, its ability to hold its shape after seasoning, combined with the ease with which it can be shaped on the lathe, makes paper birch especially valuable for the manufacture of spools, shoe pegs, shoe shanks (used in moulding the instep of certain styles of shoes), dowels, toothpicks and many wooden novelties where a nice finish is required. More than half the cut of paper birch in New England, exceeding 40,000 cords per year, is manufactured into spools. About 3,000 cords are used in New England each year in the manufacture of toothpicks, furnishing more than half the total output. Wood for this use is specially selected and is worth \$20 to \$25 per cord. Wooden boxes for tacks, face powder and salves, one-piece trays, curtain rings,



BIRCH READY FOR THE MILL.

Log pond of a large Wisconsin sawmill containing several million feet of hardwood logs ready to be manufactured into lumber and other timber products. A large majority of these logs are birch.

charcoal which remains in the retorts is used as fuel for the home, bakeries and shops; in blast furnaces; in the manufacture of gunpowder, and for filtration in sugar refineries. The wood alcohol is used for fuel, but principally as a solvent in making varnishes and shellacs, and in the manufacture of dyes, artificial leather and other commodities. The acetic acid is recovered as acetate of lime and is then refined to make ether, acetone, acetic acid and wood vinegar. Acetone is a necessity in the manufacture of smokeless powder.

The wood of sweet and yellow birch is so hard and strong, resisting the cutting of the rails, that it is now in demand for railroad ties. Since the wood in its natural state will decay in three or four years after it is placed in the ground, the ties are creosoted before they are put in the track. At the creosoting plant, after the bark is removed, the ties are loaded on trucks and run into long steel cylinders. The ends of the cylinders are tightly closed and creosote oil is pumped into them and forced into the ties under pressure. The creosote penetrates deep into the wood and prevents fungi from attacking and rotting it. The life of the tie is thus increased to 12 or 16 years, or more.

Paper birch is at present commercially most important in New England, but Minnesota has a large supply that offers excellent opportunity for development. This wood is of medium weight and hardness, strong, tough, close grained and of uniform texture. Green wood is



Photograph from *American Lumberman*.

A TYPICAL PIECE OF BIRCH TIMBER

A yellow birch butt log lying in the forest ready for removal to the sawmill. This is typical of the timber which the forests of Wisconsin produce.

clothes pins, pail handles and hundreds of similar articles are very largely made of paper birch.

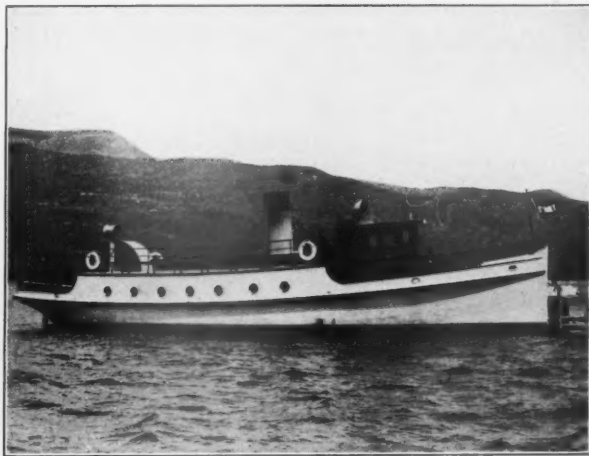
The wood is too soft for hardwood lumber and not sufficiently striking in appearance to be popular for furniture or interior finish. It is too perishable for use in the open without preservative treatment. It is adapted

for making paper pulp, as are the other birches, but the supply is not large enough to make this use important. Some of this wood is also employed in the manufacture of excelsior, and for staves, heading and hoops for slack cooperage. For turnery and many other uses the white sapwood only is used. Trees 5 or 6 inches in diameter, growing under favorable conditions, are practically all sap wood, but larger trees begin to form heartwood, which has an objectionable red color—the so-called “red heart”—that reduces the value of the wood.

The Indians and early settlers used the bark of paper birch for berry buckets and containers for maple sugar, by stripping it off in rolls the size of a stove pipe or larger. Many thoughtless berry pickers still follow the custom, thereby causing the death of many trees. The Indian not only frequently covered his lodge with sheets of paper birch bark, but made the famed birch-bark canoes of it. These canoes were ribbed with cedar and then covered with large sheets of bark. The seams were sewed with threads made of the roots of spruce or cedar and closed with the pitch from Balm of Gilead. John Burroughs writes:

“The great triumph of the birch is the bark canoe. The design of a savage, it yet looks like the thought of a poet and its grace and fitness haunt the imagination. I suppose its production was the inevitable result of the Indian’s wants and surroundings, but that does not detract from its beauty. It is, indeed, one of the fairest flowers the thorny plant of necessity ever bore.”

The principal use of the bark today is for souvenirs, in which there is a considerable trade.



GLACIER PARK LAUNCH FINISHED IN BIRCH

In boat building a little over one million feet of birch is used annually, the wood being employed principally as interior finish for cabins of motor boats, launches and similar pleasure craft.

White birch is found in commercial quantities in New England and northern New York. It has light, soft, weak wood, which decays quickly when exposed to the weather. It is used quite extensively in the manufacture of tools, shoe pegs, barrel hoops and wood pulp, and like all other birches is often cut for fuel.

River birch is as plain a wood as can be found in the forests of this country, and all its uses are based

on service or convenience. In Louisiana it is considered one of the best obtainable woods for ox yokes, many of which are needed in lumbering operations. It is stronger and stiffer than white oak, and much lighter. It is also used to some extent for slack barrel headings and for the bands which stiffen the tops and sides of peach baskets. The wood bends in a satisfactory manner, which



BIRCH FOR INTERIOR TRIM

Birch is extensively employed as interior trim in house construction. It ranks eleventh in this industry and can be obtained in any of the various standard forms of finish into which other species of finish woods are manufactured. Birch is especially prized for door and panel work.

is an important point in places where it is cheaper than elm. It makes a desirable flooring where hard service rather than handsome appearance is a requirement, as in warehouses, barns and factories. It is employed as a furniture wood for frames or to be overlaid with a veneer of more expensive woods. It is also a common wood for all kinds of woodenware, such as picnic plates, butter dishes, kitchen utensils, small handles, washboards, and ironing boards. It is light wood, impervious to water and easy to work.

VERMONT ACQUIRES LARGE AREA

THE Vermont Forestry Department has just concluded the purchase of a tract of about 2,000 acres lying on the east side of Mount Mansfield. This property, added to the one acquired a year ago on the west side of the range, makes the total area about 5,000 acres. The Mansfield Forest thus becomes not only the largest State forest in Vermont, but, next to the Crawford Notch forest in New Hampshire, the largest in New England. It is understood that the State of New Hampshire paid \$100,000 for the Crawford Notch property of 6,000 acres, while the Mansfield Forest will cost Vermont about \$13,500. However, in the former case the timber was included in the purchase, whereas funds were not available for the Vermont Forestry Department to purchase the merchantable timber. A fairly satisfactory arrangement has been made by the State Forester with the grantors whereby they agree not to cut spruce and fir trees which are less than 10 inches in diameter; and hemlock and hardwoods less than 15 inches, all trees to be measured at breast height.

The Grand Canyon of the Colorado

BY MARK DANIELS

Former Superintendent of National Parks

FOR years I have read descriptions of the Grand Canyon with about the same feeling one would peruse Joe Miller's joke book. I have marveled at the conceit of those who had the temerity to essay the task and laughed at their frantic efforts to convey something of its impressiveness by the mere use of words. Icarus, with his wings of wax, was not more presumptuous, though he came nearer to attaining his ambition. Yet, here am I, after marveling at the courage of those who have so fearlessly launched their frail bark of metaphor upon the tossing sea of description, engaged upon the selfsame task. I am free to state, however, that mine is the valor of ignorance.

Senator James D. Phelan said, in speaking of his native State, "You can't tell the truth about California

without lying about it." If this is true about California, and nothing has occurred to my knowledge to justify a doubt of the Senator's veracity, it goes double for the Grand Canyon. With the Senator's recital as a premise, any little statement which may here appear that cannot be verified will be considered, I hope, as one made in order to bring out the truth about the Grand Canyon.

The average person's conception of a canyon is a gorge in which a river runs through the mountains. Mountains in some way seem to be part and parcel of a canyon. The first feature at the Grand Canyon which strikes one, therefore, is the almost absolute level of the surrounding territory. One begins to wonder why the water did not spread over the landscape and thereby fail to cut a channel. It is these very level rims that add



LOOKING NORTHWEST FROM NEAR PIMA POINT, GRAND CANYON

This photograph, better perhaps than any other in this article, gives an idea of the tremendously impressive sight of the yawning gorges and the majestic boldness of the canyons, peaks and plateaus.

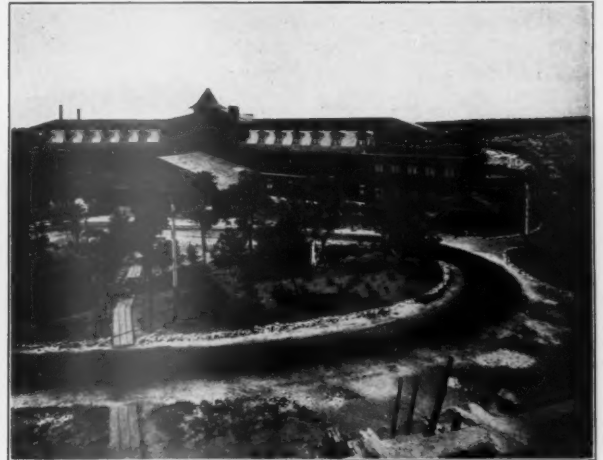


HERMIT'S REST

This attractive place, from which there is a glorious outlook, is at the head of the Hermits Rim road.

so much to the grandeur of the spectacle, for they admit of a sweep of the vision up and down the canyon for many miles.

The Canyon proper is over 60 miles in length, from 10 to 14 miles in width and of an average depth of 4,400 feet in the vicinity of El Tovar. I have been advised that the above is about as far as any sane individual should attempt to go with serious description of this subject, but, like the sirens of old, the coral cliffs, yawning abyss, glorious gehenna, towering temples and such like phrases sing their irresistible song that leads to literary destruction. There are really two canyons, one above the other. The lower one is about one thousand feet deep and is in almost solid granite. The walls of this portion are more like the canyons of the Sierra Nevada in California and they form what is called



THE EL TOVAR HOTEL

From the windows, porches and grounds around this hotel one may see miles of the Canyon, and if no other view that is obtained here was to be had the trip would be well worth while.

the "granite gorge." On the rim of this gorge is a plateau which extends backward for a mile or so, gradually merging into the talus piles of the upper cliffs that rise 3,400 feet above the plateau. From the upper rim the plateau, over a half mile below, appears smooth

enough to make an afternoon ride on horseback a delight of cantering and posting, but as a matter of fact it is so rough and broken with piles of boulders as to make a trip over it well nigh impossible. There is a trail, so called, that leads from the Hermit Trail along the rim to the Bright Angel Trail, but from personal experience it is not, in my opinion, advisable to take the trip, although quite a number of people have tried it.

The Canyon bottom is reached by trail in two places, one right below the hotel and the other at a point about 20 miles up the river. These two trails are known as the



Photograph by Fred Harvey

VIEW FROM NEW HERMIT RIM ROAD

Here is to be had one of the most wonderful of the many wonderful views at the Canyon. It is on the way to the new Hermit Trail, which, because it is a much easier descent than the Bright Angel Trail, is yearly becoming more popular.

Bright Angel and the Hermit Trails. The former is perhaps the most terrifying horse trail in America, if not in the world. In many places it is built out from the vertical cliff and overhangs a thousand feet of depth below. While the trail is not as dangerous as some in the Yosemite National Park, or in the Mount Whitney country, it nevertheless possesses those curious characteristics which tend to make one recall the past with that suddenness which leads to prayer. From the upper rim none of those imps of terror are visible and the uninitiated approach the first few yards of the downward trail with just about that degree of nonchalance with which one might expect to see a professional golfer step on to a putting green. But he soon learns that this is no way to "address" the Bright Angel Trail, for his "stance" must be taken from the back of a long-suffering mule.

Since we have fallen into the vernacular of golf, I would say that the carry is one that has never yet been properly estimated. At first glance, and even after some study, the distance seems moderate and the hazards trivial, with few opportunities for putting. The latter, however, is the greatest mistake of all for, with all due

regard to the excellence of the hotel's cuisine, putting is the principal pastime of the novice on the Bright Angel Trail. On one trip to the Canyon, I saw an elderly Irishman repeatedly calculating the distance to the bottom. I asked him if he intended to make an attempt and he said he thought he would, that he figured he would have just about enough time to reach the river below and return for dinner. When I remonstrated he said it was an easy matter for him. I watched him start, and about 2 p. m. I saw him, less than a third of the way down, turn and head back. That evening I said to him, "Did you reach the bottom?" "No," he replied, "Oi didn't get as far-r as Oi thot Oi wud—but thin Oi didn't think Oi wud."

Everyone who visits the canyon seems possessed of the ambition to descend to its bottom. No doubt he is led by that same ambition which prompts the average traveler, for the first few days, to order and eat everything upon an American-plan bill of fare. The result, too, is about the same, for after the experiment he frequently can hold nothing on his stomach but his hand. All admonitions of the guide to close the eyes and let the mule do



Photograph by Fred Harvey

LOOKING OVER THE RIM NEAR EL TOVAR HOTEL

At this point the canyon is about 4,400 feet deep, and it is possible to see up and down the canyon for many of its sixty miles of length. It is fourteen miles wide but does not seem so because distances here are difficult to judge. The Bright Angel trail starts close to the hotel.

the work are fruitless. You know you are going to fall off anyway and with your eyes open you may have your downward trip brightened by the sight of others in flight.

To me, the trip down does not enhance the glory of the picture that one carries away after a view from the rim. In fact it detracts from it. The canyon is



THE POWELL MONUMENT

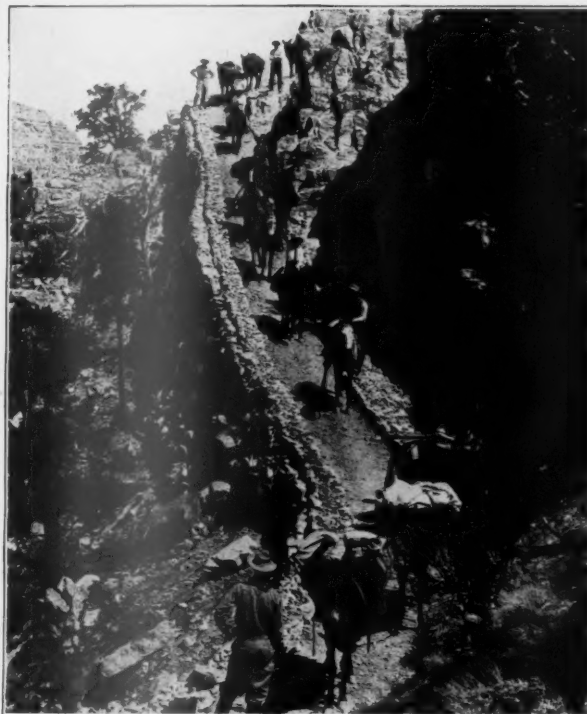
A view of the monument to Major John Wesley Powell showing the altar and bronze tablet. The monument was designed along the lines of the old Aztec sacrificial and ritualistic structures with as little of the elements of modern design as possible.

not a place that invites intimacy. It is a sight to behold, one to study day after day from various points on the rim, and one the contemplation of which is calculated to tax the imagination and inspire the observer. The effect of intimacy is apt to prove iconoclastic. Of course, if a trip in the canyon is approached in the proper spirit and is planned to admit of several days' sojourn in its depths, the real inner spirit of the place is sure to be felt. I can imagine nothing more wonderful than a few nights spent on the lower plateau with the brilliant stars seen above as from the bottom of a well and the moonlight and dark shadows making vast temples and pyramids of the cliffs and buttresses of the canyon walls. But most people do not do this. They merely mount a mule and scream their fainting way down the trail and back again, after which they hustle aboard the train in frantic haste to reach home and tell their friends of the harrowing experience.

The Hermit Trail is a much less terrifying route. It is laid on an easier grade, is fairly wide and seldom skirts the face of the cliff. Were it not for the fact that it leaves the rim at a point some miles from the hotel, it would no doubt be universally patronized. Due to the fact that a certain active and imaginative resident of the State of Arizona has plastered almost all of the canyon with mining claims, it is impossible to build a train from rim to river without his consent. As a result the Hermit Trail only goes as far as the granite rim. The hotel interests wished to continue this trail to the river and to build some comfort stations and a structure to house tourists over night on the lower plateau. Such improvements are greatly needed, and, if made, would receive

the hearty approval of those who love the canyon. But the owner of the claims will not permit any such thing—except for a sum—despite the fact that this is a national monument and supposedly under federal control. Whether any mineral has ever been discovered there or not I do not know. Possibly a trace here and there has been found, but certainly no deposits in paying quantities. But then, possibly this enterprising person is going to transmute the metals or disprove the theory that it is impossible to get blood out of a turnip. I venture to say, however, that if any gold is taken out of these claims, it will not come from "pockets" in the cliffs.

The most serious obstacle to the development of places for accommodating the tourist in the canyon is the lack of water. There are only two or three places above the river in the vicinity of the hotel where water can be had, and at these points the quantity is limited. Of course they are on mineral claims. Nearly everything but the scenery is, but this should not excuse the Government from the obligation to either develop or



ON NEW HERMIT TRAIL

This pathway down the precipitous sides of the Canyon was recently completed and is considered rather easier traveling and less of a strain upon the traveler who may be nervous about descending the steep slopes to the floor of the Canyon.

permit others to open up the canyon to those who would like to go through it in some degree of comfort.

If one is really bent upon doing the trip properly, and is willing to suffer a few frights, there is but one practical route. Start from the hotel and drive along the rim road some 10 or 11 miles to the head of the Hermit Trail. There, after due ceremonials incident to a change in the means of locomotion, some really trustworthy mules will be led forth to serve as the ship of

state. These mules are really possessed of an unusual degree of intelligence. Without dwelling at length in the usual established way upon the subject of these long-suffering beasts, it is only fair to say that while their appearance is not enticing, before the trip is over, for one reason or another, their riders invariably clasp them around the neck several times with an impassioned hug.

The trail from the rim down to the camp on the plateau of the Granite Gorge, if taken leisurely, will prove to

and the increasing heat brings back, with each step, a deeper longing for a return of the cool shades of the night before. If the heat is not disagreeable, the reckless way in which the mule steers you around sharp curves, with swinging rudder hanging over cliffs of dizzy heights, is apt to prove very much so. The trail is none too smooth, and this, coupled with the fact that it frequently runs within a few feet of the cliff, is well

calculated to confine attention to that portion of the landscape which is within striking distance. But to one who is accustomed to mountain trails, the scenery is superb. Views up and down the canyon are to be had at every projecting point, with here and there a glimpse of the river below. If a day spent on this trail, with the river over a thousand feet below, and the rim over three thousand feet above, will not jar one's mind back into a normal sense of the relative importance of things, probably nothing will. Mr. Irvin S. Cobb's retort to a certain gentleman of San Francisco about expresses the effect such a trip has upon most people.

Mr. Cobb, so the story goes, was in conversation with this gentleman when it came out that Mr. Cobb had just arrived from a sojourn at the Grand Canyon. In order to leave no doubt in the minds of those present of his own descriptive ability, and to prove that at least two of those present could wield the king's English with eloquence, the gentleman in question began a lengthy and glowing description of the canyon. After introducing



LOOKING EAST FROM HOPI POINT

The Major Powell monument on the rim of the cliff may be seen to possess some of the inconspicuousness which was striven for. The materials are the country sandstone, which fact helps to make the structure blend into the landscape. The location selected commands a superb view and is yet not prominent in the general surroundings. The monument was designed by the author, Mark Daniels, former Superintendent of National Parks.

be a succession of astounding pictures which may be enjoyed with few distractions, and will bring you to the camp in time to admit of a bath before dinner. The plunge is a luxury seldom anticipated but always appreciated. About 400 yards below the camp there is a pool hollowed out of the sandstone, through which the small stream runs. The sides of the pool are smooth and clean and the bottom is sandy. Never was cool water more welcome to tender, burning feet than the crystal-clear water of this little pool. The spot, too, is in the shady depths of a tributary canyon, and screened from the outside world by towering walls of stone. The luxury of it relegates enameled tubs and crash towels to the realm of darker ages. When the stars come out and the moon rises, the place takes on the aspect of a fairy land, weird beyond the dreams of childhood. The next morning begins the dangerous and terrifying part of the trip along the rim of the Granite Gorge. The sun comes out

all of the superlatives at his command, he wound up by asking Mr. Cobb if that great yawning chasm, with its unfathomable depths, its towering bastioned walls, et cetera, didn't make him, Mr. Cobb, feel small as he stood upon its noble brink. Mr. Cobb hesitated a moment, and said in his drawling way, "It sure did. In fact, when I got back to my room, I had to climb upon the bureau to shave."

No conscientious or honest description of the Grand Canyon is complete without a note or two on that genus, *homo touristii*, which does its traveling "en costume." Whether this particular variety of the species carries a complete outfit for each stopping place or not cannot be stated, but that the same one will bob up in a different costume in several different places in the same season I can testify. It is not uncommon to see one solemnly stalking the terrace of the hotel on the brink of the canyon fully arrayed in the accepted theoretical version of a

western bad man's costume. High-heeled black boots, corduroy breeches, blue flannel shirt, red silk bandana carelessly tied about the throat, with the knot under the chin, sombrero, with the Montana peak, and, yes, the trusty dagger at the hip or fastened to the belt—these constitute the stock costume. Mr. Brandt, who has for the past eight or ten years devoted his energies to the operation of the hotel and the protection of innocent natives from wild tourists, described the raiment of one who came to the canyon possessed of a fierce determination not to appear conspicuous amongst his western brothers. He wore the regulation boots, shirt, bandana, and in addition, perhaps to warn some presumptuous bandit of the futility of any attempt to violate his person, had thrust a long knife down each boot, while from his hip protruded a .44-caliber horsepistol. Thus arrayed full panoplied for war, a lesson in preparedness, he sat upon the veranda of the hotel for three days without so much as setting foot upon terra firma, and departed silently in the night of the third day. For some time I wondered at the name of "Montgomery Ward Cowboys" given to such men by the plainsmen and mountaineers of the localities most visited. Upon a recent trip to Chicago I saw in a show window just such a costume draped upon a waxen image, with a note beneath apprising all observers of the fact that such was the only costume that could be fittingly worn west of the Continental Divide.

Despite my frequent visits in the Southwest and many friends of long standing who are engaged in various occupations in the arid lands, I have never been quite able to determine just where they leave off telling the truth about their country, and begin what they please to term stringing the tenderfoot. As a result, I am inclined to be incredulous regarding the various tales of wild animals, horrible accidents and hairbreadth escapes which the guides delight in repeating. For instance, I have it upon the authority of no less a person than Peter B. Kyne that the "hydrophoby skunk" which Irvin Cobb jokes about is a living, odiferous reality. He tells me that there is no doubt that there is a species of skunk infesting the vicinity of the canyon whose bite is hydrophobic. How this can be proven is a mystery to me, for I should be inclined to consider that any person who was fool enough to let a skunk get sufficiently close to bite was possessed of an insanity worse than hydrophobia before that animal entered the arena. I am also informed upon the same authority that the tales of wild asses in the canyon are not myths. On the contrary, one may at times get close enough to them to distinguish between those that live on the north and those that inhabit the south side of the canyon. Perhaps one can determine on which side of the canyon an ass lives by the difference between the lengths of the legs on either side, for I am also told that a wild ass always heads upstream. This naturally would wear the legs on the right side of the inhabitant of the south bank of the canyon shorter than the others, while the reverse would be true for those on the north bank. Be that as it may, there is little doubt that many animals have been frightened out of all

semblance of control by the hoards of strangely costumed tourists who visit the district, and choose to cast their lot with the hydrophobia skunk rather than to suffer longer the burden of tourist weight on the repeated trips down the trail.



IN TUSAYAN FOREST

Along this road and through this forest the visitor is taken to Grand View which, in greater measure than might be expected after seeing other so-called grand views, justifies its name.

The guides are peculiarly adept in fastening a new story upon the first thing at hand, and already new ones are being woven around the recently erected monument to Major John Wesley Powell which has just been completed upon a point of the rim, the designing of which finally fell to the unfortunate writer's lot. Many plans had been submitted, all of which were most excellent in themselves, but, in the opinion of the judges, not exactly appropriate. To ask one what would be an appropriate monument for the Grand Canyon is almost comparable to asking what would be a fitting statue for heaven. In the opinion of many, a mere pile of stones with a tablet might have been best, but there was the appropriation which Congress made way back in 1909, the bronze tablet to Major Powell already cast, and something had to be done for the money. The monument, as built, is patterned after the design of an old Indian sacrificial altar, which consists of a pyramid forming a raised platform, on which the altar proper was placed to receive the bloody sacrifice. The monument is as like a pile of stones as any structure could reasonably be, and is perhaps as inconspicuous as might be desired.

Not long ago, shortly after the monument was finished, a tourist asked her guide what the structure was. He told her that it was on the spot where the last of the Aztecs, a nomadic group since lost, had sacrificed an American officer to their gods. She seemed to sense a certain tendency toward anachronism. When she read the tablet she cried, "Why, this is to Major John Wesley Powell, who discovered the canyon." Unabashed, he replied, "Sure, he discovered the canyon. That's why they killed him."

Perhaps it is not right to write of the Grand Canyon in a light or bantering way, but then, what is one to do? No words can describe it. To one who has seen it any



HOPI INDIANS READY FOR A DANCE

Every night in the Hopi House close to the El Tovar Hotel the Indians give their folk dances for the visitors and are the chief attraction of the place when the night comes and the Canyon is robed in darkness.

attempt at description seems puerile, while to those who have not visited the place serious attempts sound ridiculous. It is a place that defies superlatives. It is the most amazing spectacle on earth. Go and see it, and then listen to yourself as you describe it to your friends.

\$10,000 FOR FORESTRY WORK

THE Virginia legislature has appropriated \$10,000 a year for the operation of the State Forestry Department under the operation of State Forester R. C. Jones. This is the first appropriation ever made by Virginia for forestry work.

SAMPLE COPIES OF AMERICAN FORESTRY

MEMBERS of the American Forestry Association having friends interested in trees, woodlands and forests are urged to send their names to the association, and a sample copy of the magazine, AMERICAN FORESTRY, will be sent to them with the compliments of the member.

A TREE WITHIN A TREE

HERE is a tree growing within a tree. The burned-out old stump of a goosequill redwood (*Sequoia sempervirens*) is serving the excellent purpose of protecting its youthful successor from the winds. The stump and the young tree are on the property of the Glen Blair Lumber Company in Medocino County, California. While such a condition is not uncommon, it



Photograph by S. M. Bunnell, Pasadena, Cal.

GROWING WITHIN ANOTHER TREE

A young sequoia in Mendocino County, California, which selected an unusual place to grow and is making headway because it is so well sheltered from the winds.

is not often found so located that it can be readily photographed. The young tree within the stump, like others at the sides and back of the stump, is a shoot from the roots of the tree which formerly stood there. The original was about 11 feet in diameter and had been broken off in some storm and later burned.

The Bird Department

By A. A. ALLEN, PH.D.

Assistant Professor of Ornithology, Cornell University

PLANTING TO ATTRACT BIRDS

EACH year in the United States it is becoming more and more evident that urgent measures are necessary if we would preserve and increase the remnant of our native birds. While the change of conditions concomitant with the clearing of the land and the development of agriculture has undoubtedly aided the increase of a few species like the robin and house sparrow, the great majority of birds have decreased very rapidly. The robin and house sparrow have thriven because their food supply has become more plentiful and they require no more shelter than is afforded by the habitations of man and the few shade trees that he may plant about his dwelling. But most birds require more than this. The clearing of the forest and the woodlot, the mania for cutting down hedgerows and cleaning up all waste land has left the warblers, vireos, thrushes, flycatchers and many others with no place to retreat, no place to raise their kind.

It is true that great unbroken stretches of forest are remarkably poor in bird life, but the real deserts exist in the extensive grain fields and the city parks. Between the forest and the grain field, however, there is a mean which is most favorable to bird life, which admits of extensive and intensive agriculture, of cities and their parks, yet includes abundant provision for birds. This is realized in few places today. The problem is one for the forester as well as for the farmer and for the state.

More and more we are coming to realize that it is not sufficient merely to forbid the shooting of birds to promote their increase. We must provide a natural food supply and a place for them to nest. In the last number of *AMERICAN FORESTRY* we discussed the problem of the decrease of hole-nesting birds with the growth of modern forestry and the necessity for supplying nesting boxes to replace the natural nesting sites which are fast disappearing. The same argument obtains for birds nesting in thickets or cover of any kind. If the country is cleared and no consideration given to the needs of the birds, we must expect a great falling off in their numbers until we have made provision for them. Nor is it sufficient merely to set aside pieces of waste land, call them sanctuaries, letting nature take its course and expect these areas soon to supply the whole surrounding country with birds. The sanctuary is a long step in the right direction, be it established by the Government, the community, or the individual, and will probably do more than any other one thing to reestablish our vanishing birds and game. But just as the forest requires care in order to yield profits, so the sanctuary requires an ex-

penditure of thought and labor to yield birds. The ordinary city parks are sanctuaries in so far as shooting is prohibited, yet they are usually poorer in bird life than the woodlot, teeming with bird enemies and echoing with the shots of hunters and boys. The reason is not difficult to find. Most parks have been laid out with no



A WINTER TABLE CLOTH

Horned larks feeding on the snow. Many horned larks are permanent residents in the northern United States, although a distinct migration occurs during February—the lark being the first of the migrant birds to arrive in the northern States.

thought as to the requirements of birds; they are lacking in some essential. And so will be our sanctuaries, our reservations, our estates, our farms, our back yards, unless we stop to investigate the needs of birds and seek to meet them. This can be accomplished by the planting and suitable arrangement of trees, bushes and vines which supply the best food and the largest number of nesting places.

PLANTING TO SUPPLY FOOD

Let us first consider how we may increase the natural food supply. We will omit from consideration at this time the planting of such annuals as millet, sunflowers, buckwheat and kaffir corn which, while of great importance about the farm, sanctuary or game reservation, have no direct bearing on the problems of forestry. There are, however, many hardy shrubs and trees known to bear fruit attractive to birds which may well be included in a general scheme for planting in a sanctuary or in general reforestation.

The number of birds which depend upon fruits for

their sustenance during part of the year, at least, is surprisingly large and includes birds of almost every type from the woodpeckers to the thrushes, even the warblers. vireos and flycatchers being fond of some varieties.

In planting to supply fruit an effort should be made



NEST OF THE HORNED LARK

This nest was overtaken by a snowstorm during early April. The horned lark is the first of the smaller native birds to nest, often beginning to build as early as the middle of March so that frequently the birds are snowed in while incubating.

to select trees and shrubs with different fruiting periods, so that the supply will be more or less continuous. If nothing but mulberry trees were planted, for example, the birds would have a surfeit during June, July and August, but would starve during September and October. If wild black or bird cherries are added, the birds will be provided for until November. The Virginia creeper and wild grape will hold their fruit through the entire winter, and the hackberry, sumacs and barberry practically throughout the year. These last mentioned, while not so attractive, in the fall, when other fruits are available, are often the means of saving birds during the storms of early spring.

Mr. W. L. McAtee, of the Biological Survey, at Washington, has prepared a list of fruit-bearing shrubs and trees attractive to birds, in which he gives the fruiting season of each species.

Anyone considering the planting of fruits for birds should consult this list in Farmers' Bulletin No. 621. Most of these bushes and trees lend themselves to ornamental planting quite as satisfactorily as the more popular shade trees and could be used to great advantage about private grounds as well as in forests and sanctuaries.

Another strong argument in favor of planting the wild fruits is that of protecting the cultivated varieties. In some places the robins and waxwings do much damage to cherries, the catbirds and thrushes to berries, and the warblers to grapes, but in every case it is because there

are no native fruits in the neighborhood to supply their need. It is well known that birds prefer the native to the cultivated varieties wherever they are allowed a choice. If one is planning to grow berries where there are birds, he should see to it that there are wild berries somewhere in the vicinity; if he is to grow cherries, he should plant mulberries, June berries, wild cherries, honeysuckle or red-berried elders about his orchard. If the birds bother the apples or pears, there are always the Asiatic service tree, the crab apples and thorn apples that can be offered to them in part payment for the services which they have rendered at all seasons of the year.

The second problem in a bird's life is that of shelter. Although an abundant supply of food will usually serve to detain birds, they will not remain to nest unless abundant and attractive shelter for raising their young is offered. Broadly speaking, birds prefer bushes and trees having a thick or scrubby method of growth in which to conceal their nests. They likewise show a preference for those which are easy of access to their feeding grounds. In nature, the best feeding grounds are about the edges of forests, in clearings or along streams. Nine-tenths of the birds of a region are found nesting in such places while the center of the woods is almost devoid of bird life. On a smaller scale the same holds true of the woodlot and the thicket, nests are arranged chiefly around the edges. In fact, we might say that the amount of available nesting ground varies directly with the *circumference* of the woodlots or thickets rather than with their area. A large number



WINTER FOOD FOR ROBINS

Robins feeding on the berries of the Virginia creeper. These berries remain on the vine all winter or until consumed and are relished by all kinds of birds from the vireos to the woodpeckers.

of small thickets or woods, each surrounded by a little open country, therefore, would shelter many more birds than the same area of woods or thicket all in one piece. A few species require extensive growth of forest all

about them as though to insure safety, but the majority are more dependent upon the clearings. Ideal conditions for the nesting of the largest number of birds on a given area would be obtained by covering it with small groups of the proper kind of bushes and trees, each group surrounded by a little open space. This presupposes, of course, that there is likewise a sufficient supply of food and water. The customary ideas of landscaping held today with scattered groups of bushes and trees are favorable to bird life, especially when consideration is given to the species planted or to the method of clearing. In the forests the cutting of fire trails and small clearings tends to increase rather than decrease the bird life for the same reason. This general arrangement of the planting is as important as the actual selection of the species.

It is often possible to select for planting trees and shrubs that furnish available fruit as well as nesting sites. When the tree combines aesthetic and practical values, as well, it is highly desirable. Such are the red cedar and Irish junipers among the evergreens, the elms, the hawthorns, the wild rose and Virginia creeper.

Below is appended a list of woody plants suitable for attracting birds. Those unmarked bear fruit relished



A FAVORITE LUNCH COUNTER

Cedar waxwings feeding on the berries of the mountain ash. A flock will remain about one tree for days or weeks at a time until every berry is consumed.

FRUIT-BEARING TREES AND SHRUBS ATTRACTIVE TO BIRDS

- *Five-leaved Ivy, or Virginia Creeper. Aug.-Feb.
- Boston Ivy. Sept.-Mar.
- Red and Black Chokeberries. July-June.
- *Spicebush. July-Nov.
- *Japanese Barberry.
- (The berries are not often eaten when other fruits are abundant, but the shrubs furnish good nesting sites.)
- *Common Barberry. July-June.
- Black, or Cherry, Birch.
- Yellow Birch.
- Red Birch.
- (All the birches furnish food in fall and winter except the Red, or River, Birch, the fruit of which ripens from June to September.)
- White Birch.
- Hackberry. Jan.-Dec.
- *Dogwoods. June-Mar.
- White-flowering dogwood.
- (Very desirable for its ornamental value, both in flowers and in fruits, as well as for bird food.) Aug.-Jan.
- Cornelian Cherry.
- *American Hawthorns. Oct.-April.
- *English Hawthorn. Aug.-March.
- Weigela, or Diervilla.
- (The seeds are freely eaten in winter by slate-colored juncos, tree sparrows, redpolls, and pine siskins.)
- Oleaster, or Wild Olive. Sept.-April.
- Gumi.
- Japanese Oleaster.
- (As soon as the fruit ripens in July it is attacked by robins, catbirds, and cedar waxwings, and the tree is soon stripped.)
- Spindle Tree.
- (Fruits are eaten by the myrtle warbler.)
- Wintergreen. Jan.-Dec.
- Black Huckleberry. July-Oct.
- Shrubby St.-John's-wort.
- (In winter slate-colored juncos, tree sparrows, and redpolls are always found feeding on the minute seeds of this plant.)
- *Common Juniper. Jan.-Dec.
- *Irish Juniper.
- *Red Cedar.
- (A favorite food of cedar waxwings and myrtle warblers.) Jan.-Dec.
- American and European Larches.
- *Common Privet. July-April.
- *Bush Honeysuckles.
- *Japanese Honeysuckle.
- *Morrow's Honeysuckle. (Very attractive to birds.)
- *Ruprecht's Honeysuckle.
- *Grapes. Aug.-June.
- *Tartarian Honeysuckle. July-April.
- *Matrimony Vines.
- Partridge Berry. Jan.-Dec.
- Mulberries.
- (One of the best bird foods.) May-August.
- *Bayberry, or Candle-berry.
- (The best food to attract and hold the myrtle warblers.) July-June.
- Sour Gum, or Tupelo. July-Oct.
- White, Black, and Japanese Spruces.
- Austrian Pine.
- Red Pine.
- White Pine.
- (All the Pines attract crossbills and grosbeaks.)
- Mahaleb Cherry.
- (The best of the wild-cherry bird foods.) June-July.
- European Bird Cherry.
- Wild Red, or Bird, Cherry. June-Nov.
- Sand Cherry. June-Aug.
- Wild Black Cherry. July-Nov.
- *Flowering Crab.
- (The best winter food for cedar waxwings, robins, northern flickers, pheasants, and pine and evening grosbeaks.) Sept.-June.
- *Buckthorn. Aug.-April.
- Fragrant Sumac. Jan.-Dec.
- Shining Sumac. Jan.-Dec.
- Smooth Sumac. Jan.-Dec.
- Staghorn Sumac. Jan.-Dec.
- *Blackberries and Raspberries. June-Oct.
- *Black Elderberry. July-Oct.
- Red Elderberry. June-Aug.
- Sassafras. July-Oct.
- Buffalo Berry. June-Oct.
- *Greenbrier. Aug.-June.
- Nightshade, or Bittersweet. July-April.
- Mountain Ash.
- (As the bright red berries hang on the trees, about Christmas time, these trees add to a winter landscape by their ornamental appearance. They also furnish very good bird food.) July-April.

by birds; those bearing an asterisk furnish also satisfactory nesting sites. To this list, prepared by R. E. Horsey and Wm. L. G. Edson, of Rochester, N. Y., have been added the fruiting seasons as given by Mr. McAtee.

Many trees and shrubs not included in the list can be made to serve as nesting sites by the proper sort of pruning. Cutting back such trees as poplars so that whorls of branches are formed, or tying together the branches of such shrubs as the dogwoods increases the number of available nesting sites and has the desired effect.



A STAPLE WINTER DIET

A gold finch attracted by sunflowers. Many birds are fond of these seeds, especially in winter, and many should be planted just for the birds.

The list is not considered complete, but even a superficial inspection of it will show how one may very easily select a wide range of shrubs and trees suitable for almost every kind of planting which will at the same time attract birds by their fruits and by the shelter which they afford. Care should be used to select none which would serve to spread fungus diseases, even though they may be very attractive to birds. The various species of currants and gooseberries (*Ribes*), for example, which are often highly recommended as supplying bird food, have been omitted from the list because they assist in spreading the dreaded pine blister. In wheat-raising districts, the barberry should be avoided likewise, because it harbors the intermediate stage of the wheat rust.

BIRD LIFE IN APRIL

"April showers bring May flowers" is a saying of our grandmothers, meaning that while April, itself, is rather unattractive it is a month of promise. And also in the realm of birds, it is scarcely more than a month of

promise. The first of the month continues the wave of migration that characterized the end of March and the end announces what is going to happen after the first of May, while the whole middle of the month is rather uneventful. The migrants reaching the northern States during the first week are still those that have wintered in the Gulf States and it is not until nearly the last of April that the barn swallows, spotted sandpipers and chimney swifts herald the return of wanderers from Central and South America.

It does not seem like a month conducive to the starting of homes and the assumption of family cares. Nevertheless many birds seem unable to await the more temperate May and some begin to build even before the snow has entirely disappeared. Some are those that have been with us all winter, like the chickadees, nuthatches, and woodpeckers; others are the early migrants from the South like the robin, the bluebird and the mourning dove. The horned larks begin to nest soon after the middle of March and many are the nests overtaken by the snows of early April. We should expect that the hawks and owls would begin nesting as early as this because their food of mice and birds is ever present, and most of them are far advanced in incubation before the end of the month. One species, however, the sharp-shinned hawk, always waits until after the middle of May before starting to build. A similar paradox occurs with the goldfinches and cedar waxwings, which, while with us all winter, do not breed early like the other permanent residents, but wait until June or even July.

Another strange case is that of the phoebe, which, although one of the flycatchers and dependent on insect food, returns to the northern States shortly after the middle of March and sometimes begins nesting before the end of the month while insects are still extremely scarce. They are hardy birds, these April nesters, and many of them raise two or even three broods during the season.

GUARDING WHITE PINES

IN order to safeguard the enormously valuable Western white pine forests from the white pine blister rust now known to have foothold in six Eastern States, and perhaps also in the Ohio Valley, and, second, to avoid the necessity of a burdensome quarantine, the Federal Horticultural Board has requested all Eastern nurserymen not to ship white pines, currants or gooseberries west of North Dakota, South Dakota, Nebraska, Kansas, Oklahoma and Texas.

The white pine blister rust is a very destructive disease of all white pines, but occurs also in a different form, as a leaf disease, on currants and gooseberries, and may, therefore, be carried to new regions by any of these plants. Like citrus canker and chestnut blight, the white pine blister rust was brought to this country on imported nursery stock before the passage of the Federal Plant Quarantine Act. Ninety per cent of the infections now in North America came from a single German nursery. An attempt is being made to control the disease in the Eastern States. If this disease should spread to the

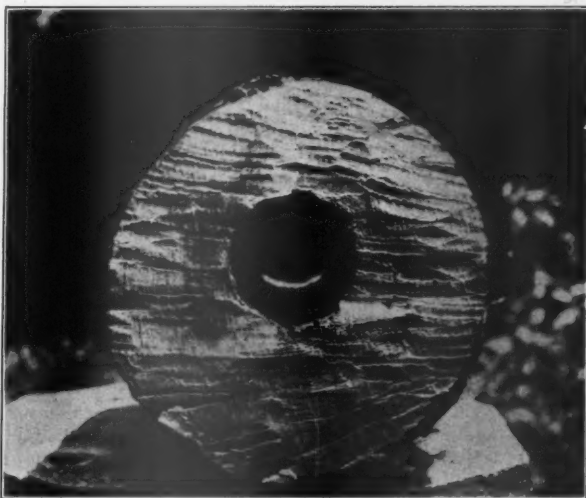
Rocky Mountains and beyond, the Western forests of white pines, which are now among our most valuable trees, will be endangered. At a very conservative estimate, the government and private holdings in these forests represent a valuation of \$240,000,000.

Compliance with this request on the part of nurserymen may make it unnecessary for the Department of Agriculture to declare a quarantine covering the known infested States, prohibiting the further interstate movement of white pine, currants and gooseberries. With the cooperation of the nurserymen, as proposed, very little, if any, hardship will be experienced, and the protection which a quarantine would give will be secured without restriction on the general nursery trade in the Eastern half of the United States.

The States within the range of the Western white pines will be warned of the danger from Eastern nursery stock, of white pines, currants and gooseberries, and the inspectors of all of the Western States will be asked to notify this board of the shipment into their several States of any of the stock referred to from points east of the western line of the States enumerated. If, as a result of this request, no such shipments are made, further action may be unnecessary. If, however, nurserymen should ignore this request, it is practically certain that a quarantine will have to be established at an early date prohibiting the interstate movement of these plants from the infested States.

WOODEN PIPE A CENTURY IN THE GROUND

SOME exceedingly interesting specimens of wood that have stood the test of time have come to light in Philadelphia recently in the work of relocating sewers in preparation for the new subway system. At the southwest corner of Washington Square, a section of wooden pipe in excellent condition was chopped out where it crossed a trench that was being dug. It was



A CENTURY IN THE GROUND

This piece of pitch pine was used in Philadelphia as a water pipe. It has a 4-inch bore and the log was about 14 inches in diameter when taken up. It had been in the ground over a hundred years.

about four feet from the surface of the ground to the center of the pipe. The wood was positively identified as *Pinus rigida*, or pitch pine. This tree grew to good proportions about here in the early days.

From 1790 to 1795, Philadelphia was scourged several times with epidemics of yellow fever, and the water supply was blamed. A "Watering Committee" accepted the plan of Benjamin Henry Latrobe; the entire system was of wooden pipes, as no others were known then. The total of wooden pipe in use by the city at any one time seems to have been forty-five and a half miles, and it was not until 1817 that the first cast-iron pipe was used. The specimens now being taken out were in the plans of the first system and were undoubtedly laid in the years 1799 to 1801. While the color has been changed slightly clear through the log, and the odor has been affected, the wood still retains a resinous aroma and is firm in texture. The logs used were of a size suitable to the size of bore, which varied from 3 to 6 inches. The specimen photographed had a 4-inch bore and the log was about 14 inches in diameter when taken up.

Wood was practically the whole thing in this first water-works system, even the boilers and much of the pumping engines having been of that material.

WILL PLANT NUT TREES

THE Board of Estimates of Baltimore has approved the city forester's plan for the planting of fifteen nut trees this spring. City Forester Maxwell expects to use these trees on one of the city reservations where conditions of growth are good and if the experiment proves successful to extend the use of nut trees to other city planting. He is trying to initiate the European idea of getting something more than shade service from trees that are planted. He will use either English walnuts or pecans in the planting.

IDENTIFICATION OF WOODS

OVER 1,000 samples of wood are annually submitted to the United States Forest Products Laboratory, Madison, Wis., for identification. The requests vary in importance from one case in which a party wished to know from what kind of wood a particular chess pawn was made to that of a contractor who had thousands of ties rejected by a railroad on the ground that they were red oak instead of white oak as specified. As a rule experienced lumbermen can readily distinguish between species commonly handled, but when a particular specimen shows some abnormal growth or discoloration they are in doubt. At the Forest Products Laboratory samples are usually examined under the microscope which makes visible many characteristics not visible to the unaided eye. The distinguishing characteristics of over 400 native and 100 foreign woods have been studied and arranged in systematic order for use in identifying samples submitted.

The Man Who Loved the Birds

John James Audubon, whose birth is commemorated by Bird Day, May Fourth

By SAMUEL B. DETWILER

TUESDAY, May 4, is official Bird Day, and the 136th anniversary of the birth of John James Audubon. Dime-novel fiction can produce no more fascinating tale than the life story of this man, whose love for birds was so great that the song of the wood thrush moved him to prayer. Passionately devoted to art and science, filled with boundless energy, he endured privation and overcame difficulties that few men would have had the power or courage to encounter. Aside from the wonderful work, "The Birds of America," that remains to perpetuate his fame, the nobility of his life places Audubon among the eminent men of our country.

Philadelphians have an especial interest in the life-story of this distinguished naturalist, since it was at his early home near this city that he first conceived and partly executed his great work. Twenty miles from Philadelphia, at the point where the Perkiomen unites with the Schuylkill and in close proximity to the historic hills of Valley Forge, lies Mill Grove Farm, which to Audubon was always "a blessed spot." It was here he spent the carefree days of his young manhood, a paragon of manly beauty, grace and accomplishment.

Mill Grove is today as beautiful and peaceful as in Audubon's time, and, as maintained by its present owner, it is an interesting memorial to the man to whom Bird Day is dedicated. Nestling among the woods that Audubon loved, on a sloping terrace overlooking the old mill and the peaceful farm lands across the beautiful Perkiomen, it is still a haven of rest and quiet. Not far distant is Fatland Ford farm, and the mansion where he first met Lucy Green Bakewell, who afterward became Audubon's devoted wife, and through her self-sacrifice enabled him to win success. Further on is the village of Audubon, which was renamed in his honor.

Within sight of the village, on the hills that line the south side of the Perkiomen Valley, are the ruins of the old lead mine, once the property of Admiral Audubon, the father of John James Audubon. It is reported that these mines furnished lead for many of the bullets used by the American army in the Revolutionary war. A path leads from the mines to Mill Grove, along the steep,

forested hillside, and in this sylvan retreat the naturalist spent many of the happiest days of his life in studying the birds with which the locality still abounds, and making his drawings and paintings. Audubon has told of his immeasurable joy over the discovery of a method of using wires to mount the subjects of his drawings in attitudes true to life. This discovery was important since it was his ambition to make his paintings accurate not only in color but to portray the characteristic haunts and habits of the birds. A small natural cave formerly extended into the steep, wooded slope not far above the old mill, and here Audubon lived with the birds, learning their ways and painting them in their natural surroundings. He records that it was in this



Photo by J. Howard Fell

MILL GROVE

It was here, twenty miles from Philadelphia, where the Schuylkill and the Perkiomen unite that John James Audubon spent his young manhood.

grotto that his bride-to-be first confessed her love for him.

The house at Mill Grove was built in 1762 by James Morgan, of Philadelphia. In 1778 it was purchased by Admiral Audubon after a visit to Lafayette at Valley Forge. The old sailor built an addition to the house and took great pride in laying out the grounds. Since 1813 the estate has been in the possession of the Wetherill family. The present owner, Mr. W. H. Wetherill, has his summer home here, and takes pride in preserving many interesting mementos of the great bird lover.

Fatland Ford farm lies on the more elevated land immediately south of Mill Grove. The mansion was built in 1760 by James Vaux, and in 1804 was purchased by William Bakewell, a descendant of the Peverils, made

famous in Scott's novel, "Peveril of the Peak." This estate also has for many years been the property of the Wetherills. The stately mansion stands in a commanding position, affording a magnificent view of Valley



Photo by J. Howard Fell

THE OLD GRIST MILL

This ancient stone structure was built at Mill Grove before Audubon lived there.

Forge and the Schuylkill Valley. One end of Sullivan's bridge was not far from the house. General Washington spent a night in this mansion when moving his battered army to Valley Forge, and twelve hours later the British army arrived and General Howe lodged there. The quaint old walled rose garden, the big stone barn, and the old "spring-house"—the first dwelling house in this locality—are in use today, in a fine state of preservation, monuments to the art of the early builders.

Audubon's father was one of a family of twenty children. At the age of twelve he was provided with a shirt, a suit of clothing, a cane and his father's blessing and sent into the world to find his fortune—which he promptly did. He became a sailor, commanding a vessel at twenty-one, owning one at twenty-five, and in ten years more realizing a comfortable fortune. He purchased an estate in St. Domingo, and later, in Louisiana, he met and married Anne Moyette. Three sons and a daughter were born to them, John James, the youngest boy, being born May 4, 1780, in New Orleans. A few years later, Madame Audubon was cruelly murdered during a revolution of the negroes in St. Domingo. The elder Audubon returned to France, where he became an admiral in the navy, and the future naturalist was brought up by a loving and over-indulgent stepmother. From his earliest years his love of nature was highly developed, and this led him to neglect studies for the investigation of the wonders of woods and fields. At this point his father mapped out a course of study, and insisted that he attend diligently to his education, but this program was seriously disturbed by the turmoil of the French revolution. His studies included mathematics, geography, drawing, music, fencing and dancing.

At Nantes, under the instruction of the great drawing master, David, he first began to make drawings of birds, and completed 200 sketches.

His father was anxious for him to win military honors, but this did not appeal to the young man, so he was sent to America to care for his father's property. Yellow fever was raging in New York when he landed, and he was immediately stricken, but was taken to Morrisville, N. J., by friends and his life saved by careful nursing. On his recovery, he proceeded to Mill Grove and found it a delightful place, entirely suited to his romantic nature. After a time his happiness was marred by the arrival of his father's agent sent to superintend the lead mines, who presumed to dictate to the young genius, but who encouraged him to make the study of birds his life-work. The authority ventured by this great agent was resented by Audubon, and when objection was raised to his proposed marriage with Lucy Bakewell, and a plot disclosed to ship him to India, the spirited youth walked, in three days, in mid-winter, to New York, where he



Photographed by J. Howard Fell

HIGH PATH THROUGH WOODS FROM MILL GROVE TO COPPER MINE

This road, as in Audubon's time, is a place to delight the bird-lover and the nature student.

borrowed sufficient funds to carry him to France. The father supported the son's action and discharged the unscrupulous agent. However, the young nature student remained with his parents for a year, indulging his taste for hunting, fishing and collecting. At this time

Napoleon called for men for his campaign against Russia, and it was decided that John James should enlist in the navy rather than be drawn in a general levy. Later, he obtained leave of absence, and, in company with a young man named Rosier, sailed for America. They landed in New York after an adventurous passage, and went at once to Mill Grove, where they were mutually happy. One writer gives an interesting account of a visit to Audubon at Mill Grove during this time:

"On entering his room, I was astonished and delighted to find it was turned into a museum. The walls were festooned with all sorts of birds' eggs, carefully blown out and strung on a thread. The chimney-piece was covered with stuffed squirrels, racoons, and opossums; and the shelves around were likewise crowded with specimens, among which were fishes, frogs, snakes, lizards, and other reptiles. Besides these stuffed varieties, many paintings were arrayed upon the walls, chiefly of birds. He had great skill in stuffing and preserving animals of all sorts. He also had a trick of training dogs with great perfection, of which art his famous dog, Zephyr, was a wonderful example. He was an admirable marksman, an expert swimmer, a clever rider, possessed great activity, prodigious strength, and was notable for the elegance of his figure and the beauty of his features,

story of the destruction of a valuable painting by his favorite hunting dog. After finishing a painting of grouse, Audubon went out of the room, leaving his canine companion sleeping before the fire. Awakening suddenly, the dog was deceived by the life-like attitude



Photo by J. Howard Fell

RUINS OF THE ECTON MINE

This mine was developed from the mine originally owned by Admiral Audubon, and the ruins are now frequently visited by tourists.



Photo by J. Howard Fell

RUINS OF OLD STAMPING MILL

All that remains of the stamping mill at the old Ecton Copper Mine. This mine is said to have supplied much of the lead for bullets used by the American army during the Revolutionary war and it later produced considerable quantities of copper.

and he aided nature by a careful attendance to his dress. Besides other accomplishments, he was musical, a good fencer, danced well, had some acquaintance with legerdemain tricks, and could plait willow baskets."

Audubon had a great fondness for animals of all kinds, especially dogs. His patience is illustrated by the

of the birds and fell upon them, ruining the canvass. On his return Audubon mildly remarked, "Zephyr, you little know what mischief you have done," and proceeded to repaint the picture.

His love for Lucy Bakewell led Audubon to ask her father for her hand in marriage, but Mr. Bakewell advised him to first enter commercial life and establish a business. With his friend Rosier, he went to New York and entered a counting house, but quickly lost a considerable sum of money through speculation, and demonstrated his lack of business ability by devoting most of his time to the gratification of his natural tastes for the woods. He was given up as a hopeless case by his friends, and returned with Rosier, who was also unsuccessful, to the more congenial surroundings of Mill Grove. During the following two years they made several trips to Louisville, Kentucky, as partners in trading ventures, and then they decided to set up a permanent establishment there.

Mill Grove was sold, and on April 8, 1808, Audubon was married to Miss Bakewell, and started on his wedding journey to Louisville, arriving after an eventful trip in which his bride was nearly killed. He and his partner were soon settled in business, but while Rosier stayed behind the counter and took care of the trade, Audubon enjoyed the hunting and social life of the planters, with whom he quickly became a favorite. He continued his studies of the birds, and his plan for a "biography of the birds" took definite shape, but the

war of 1812 came on and diminished the revenues from their business. They moved to Hendersonville, and started a new enterprise, but this proved a failure. A removal of his business to St. Genevieve, on the Mississippi River, below St. Louis, was planned, and Audubon set off with his remaining goods loaded on a barge. The trip afforded him a fine opportunity to gratify his taste for the wilderness, for the country through which they passed was an almost unbroken stretch of magnificent hardwood forest, and they were delayed by many mishaps. Continued bad fortune followed them, and Audubon started to return to his wife and family at Hendersonville, traveling on foot. With this journey began a long series of stirring and strenuous experiences that make his biography read like a romance. Poverty and privation made his life sad, for it brought suffering to his brave wife, who in spite of all their troubles encouraged him to continue the great work on which he was well advanced. Often penniless and earning a scant living with his brush as a portrait painter, and in other ways, he went from place to place, sometimes taking his family with him, but more often wandering alone. Dressed in the rough leather shirt and leggings of the trapper, sometimes weeks and months in the primeval forests, subsisting on wild fruits and meats, often forced to beg his way, he faced danger and difficulty with unlimited enthusiasm. He was happiest in the woods, and his patience and perseverance in the conquest of science and art were boundless.

Years passed in this manner, then his wife conceived the idea of assisting her husband by teaching, and eventually to send him to Europe for the purpose of finishing his instruction in oil painting (his previous work having been done with pencil and crayons). From 1822 to 1826 they labored with this end in view, and in July, 1826, Audubon landed in Liverpool, exhibited his drawings in various cities, and opened a subscription for their publication. The following December this dream came true, 170 subscriptions to "The Birds of America" at \$1,000 each having been made. Not only was he thus put at financial ease, but great honors were accorded him by Cuvier, Humboldt, Sir Walter Scott, and other great men of the day.

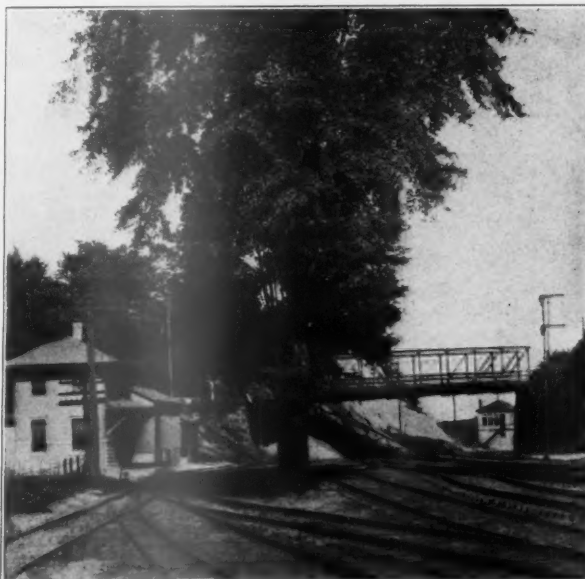
Although he might well have retired to a life of comfort, he soon returned to the wilderness to continue his great work. He journeyed from Florida and Texas to Labrador, and from the Atlantic Coast to the Rocky Mountains. When over sixty years of age, after the completion of his work on birds, he began a similar work on animals, "The Quadrupeds of America," with undiminished enthusiasm. But before the completion of this volume his physical powers failed him, and on January 27, 1851, he died peacefully at his home near Tarrytown, New York. But his memory lives, for as one who loved him has said:

"While the little wren chirps about our homes, and the robin and reed-bird sing in the green meadows; while the melody of the mocking bird is heard in the cypress swamps, or the shrill scream of the eagle on the frozen shores of the northern seas, the name of John James

Audubon, the gifted artist, the ardent lover of Nature, and the admirable writer, will live in the hearts of his grateful countrymen."

RAILROAD SAVES THE TREES

THE Sharpsville, Pa., station of the Baltimore & Ohio Railroad is being cited as evidence that some of the so-called "soulless corporations" are not so soulless after all. At Sharpsville the railroad company purchased extra land for tracks and a station in order to allow two beautiful specimens of the silverleaf



RAILROAD SAVES MAPLE TREES

The unusual consideration shown by the B. & O. R. R., at Sharpsville, Pa., in saving two fine maple trees.

maple tree to keep on growing on the right of way, although by chopping them down many hundreds of dollars would have been saved.

When the engineers ran their lines into town the plans called for the tracks to be laid over the ground now occupied by the trees. Then some of the officers of the company inspected the route and discovered the trees, and some lovers of trees made pleas for the preservation of the trees.

The pleas were heeded and the engineers had to run new lines and make plans for a curved track in order that the trees might stand undisturbed.

A similar condition cannot be found throughout the country, according to traveling men. It is not uncommon for strangers to stop and wonder at the sight of the trees growing between railroad tracks.

JANUARY, 1915, COPIES NEEDED

THE American Forestry Association will be glad to buy copies of AMERICAN FORESTRY for January, 1915, and members having copies of that month and not needing them will confer a favor on the Association by mailing them to the office at Washington, D. C.

Have you invited a friend to become a subscribing member?

THE CHILDREN'S DEPARTMENT

BY BRISTOW ADAMS

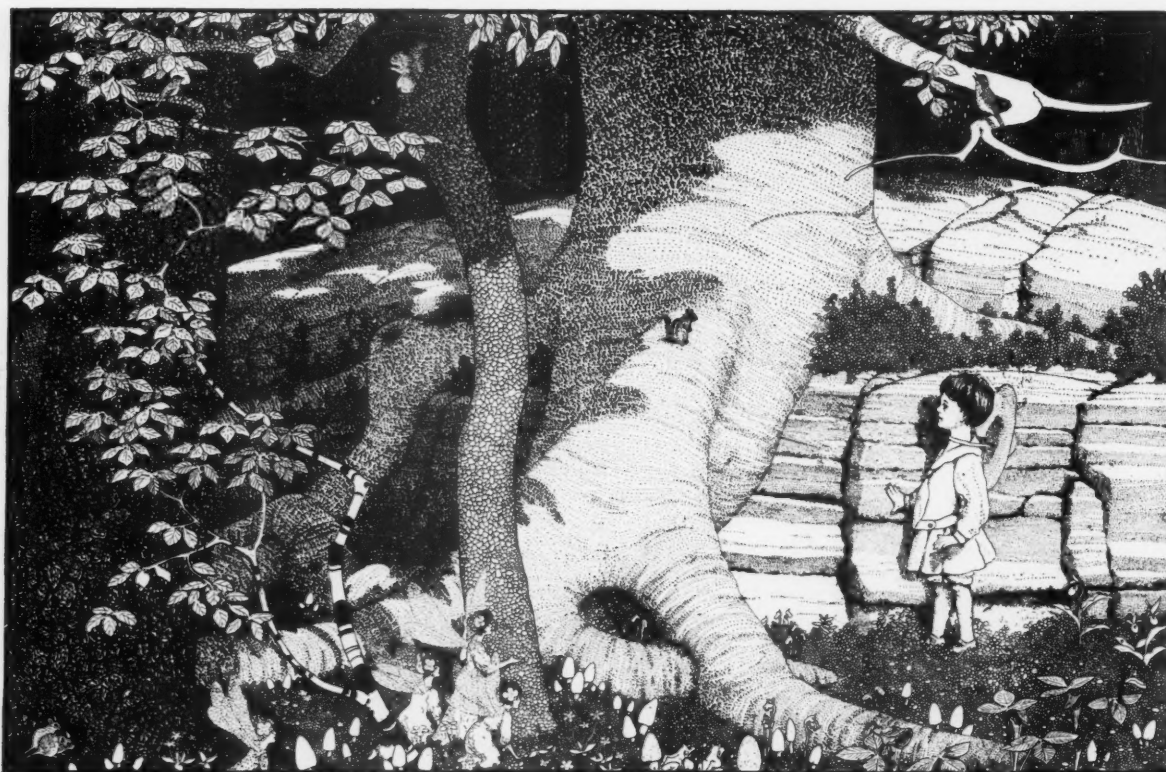
FAIRIES OF THE WOODS



LONG with the maple, the lumbermen in the North woods cut beech and birch trees and the hemlocks, since all of these are likely to grow together and to be lumbered together. This forest, as we have seen, is one of great beauty, especially in the fall, and a large part of it is all of the same age and all of the same height. A man in an aeroplane flying over the tops of the woods, especially in the fall, would see a

pine mice and white-footed mice. On still nights the voices of the little creatures of the wood can be heard on all sides, from the great cry of the horned owl to the twitterings of the little birds half-awakened from sleep but still drowsy, and the tiny squeakings of young mice in the hollow logs.

FROM the ground to the very tips of the trees there is a succession of growths of mosses and lichens in colors of soft grey, and green, and lavender, and



Drawing by Walter Stone King

FAIRIES OF FACT—CAN YOU FIND THEM?

Besides the four fairies of romance there are eight tiny living creatures—fairies of fact—of the ground, the trees and the air in this picture. Can you find them all?

succession of plains, and hills, and valleys carpeted with the most wonderful colors, with here and there a few dark, tall pine trees with their heads sticking, like little islands, above the rest. Here and there will be deep holes in this layer of trees, and these would seem to be fringed with a darker green, where spruce, or arbor vitae, or tamarack grow around the edge of lake or swamp.

BETWEEN the ground itself and the topmost twigs—which are all that the aeroplane flyer would see, there is a rich and varied life. Many birds build their nests in these trees; squirrels have their homes; and in the ground beneath there will be frogs and chipmunks,

even a brilliant red. The granite rocks on the ground are spread over with these mosses so that their color blends with that of the trees. In the shadier places the waxy white Indian pipes grow in their season, the jack-in-the-pulpit, and the moccasin flower. Toadstools and mushroom growths vary in shape and color from masses like carved ivory, as delicate as coral, to tiny, round-headed "toadstools" of most startling red and orange.

When the woods are cut, many of these little fairy-like forms are likely to be torn up and destroyed—not only the homes of the birds and squirrels, but the homes of creatures so small that we cannot see them. Yet man needs the lumber to go into homes for men, and to be put to his use in many other ways.

HERE are two lumberjacks sawing away at the base of a giant maple. Up in the top of it a flying squirrel is in hiding. He has stayed there in the tree even after all of the other trees near at hand have been cut away. His little heart beats faster than ever with each thud of the ax into the tree, and with the vibrations of the saw which go through the wood fibres from the base to the highest leaves. Soon the tree begins to sway, and the squirrel knows that he is no longer safe there. He leaps clear of the branches with a long, slanting, downward shoot, using his aeroplane to reach the nearest tree in that part of the woods which is still uncut. It is a slender, yellow birch, and as he comes near it, his flight takes a sharp upward turn. By the time he nears its trunk, he is headed up the stem full-tilt, and so on up to a branch that goes off and gives him a passageway over to another tree. In fact, all the treetops are full of these well-known runways, and certain limbs get worn smooth with the passage of the feet of the squirrels—red squirrels, flying squirrels, and all—just as man's feet will wear a smooth pathway across the ground.

THE woodchoppers see the long air-dive; out of curiosity one of them takes the long stick with which he measures log-lengths and measures off on the ground the distance which the squirrel has flown. He finds that there are just five lengths of his light 16-foot pole between the stump of the maple tree, which has just been felled, and the base of the slender birch which marked the end of the squirrel's flight. He thinks that 80 feet is a long leap for one little squirrel to undertake. As for happenings of this sort and of even more exciting kinds—well, "the woods are full of them."

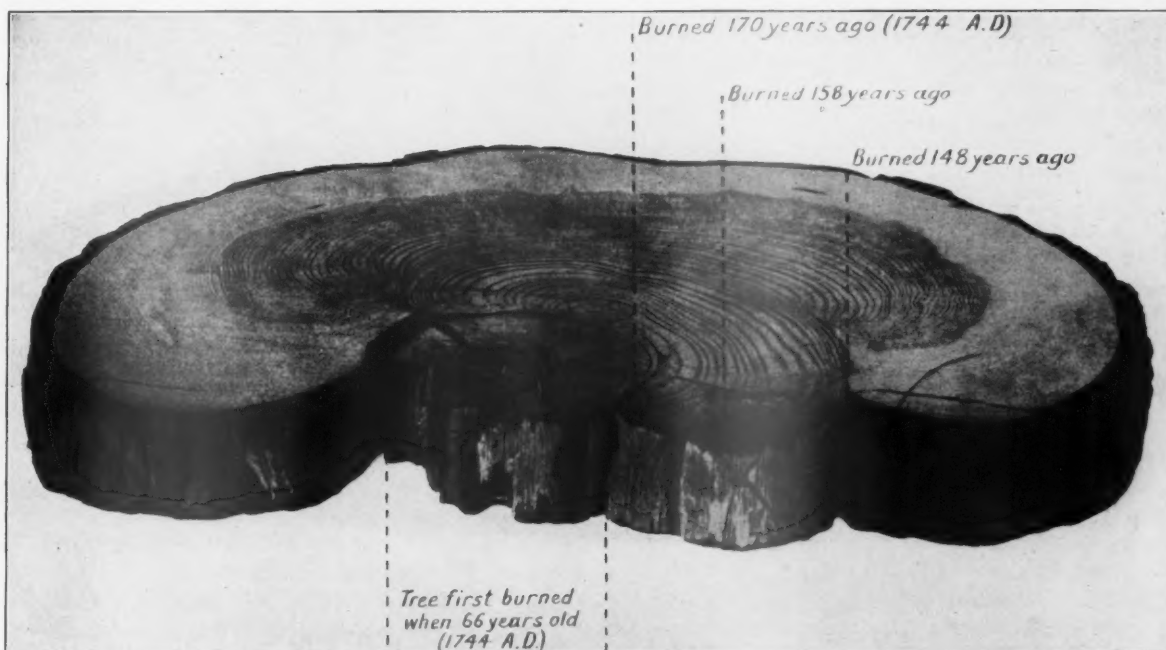
OFTENTIMES children, and sometimes even the grown-ups say that they are sorry that the age of fairies seems to be over, and yet there are more wonderful fairies of fact than the old romancers ever

dreamed of. Creatures tinier than any they could imagine are working day and night building things for man, and others, again, tearing them down. The birds themselves can be thought of as fairies with wings, working every moment for man's good, searching out the insects from the crevices in the trees and adding beauty in color and sound to man's life. The scientist has found more real fairies than all of those which have added to the lore of elf and goblin, gnome and sprite; and the scientists' fairies are more wonderful because they are tinier than was ever thought to be possible. Then, too, they have such changing and marvelous shapes. The old-time fairies were always thought of in terms that the folk-lore gatherers could understand—that is, they were in the general form of man, only much smaller. But the scientist finds that the new fairies do not have to be limited to any such forms.

SO DO not be downcast when any one tells you that there are no more fairies, but rather be glad that there are new and different ones—ones that you can study and find out about for yourself, and ones that you know are really alive today.

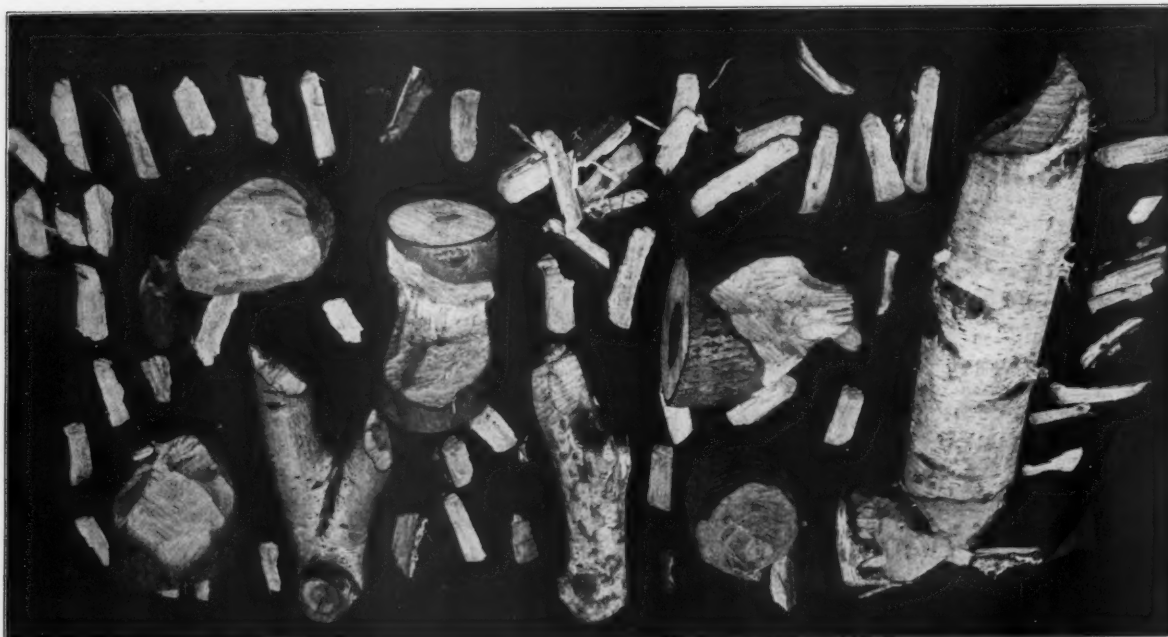
Ah, little lad, that seeks for fairy lore,
Think not that all is gone—that cold dry facts
Must do away with elves and sprites of yore
With all their witching ways and kindly acts.

Here in this time, if we will only learn
The ways of wood-folk in their work or play
We may be sure of fairyland's return
In living wonders of the present day.



SCARS OF FOUR FOREST FIRES ON THIS TREE

A section of a tree trunk showing how the dates of forest fires are ascertained from the remaining surviving trees in the fire-swept tract. Each fire which injures a tree leaves a permanent scar and the date when it occurred can be determined, or at least very closely, approximated by counting the number of annual rings between the scar and the outer circumference of the tree. This photograph and estimate were made by the Commission of Conservation of Canada.



SECTIONS OF TREES SHOWING HOW THE BEAVER DOES HIS CUTTING

The beaver is a true conservationist, because the trees that he cuts up to store away for a winter food supply are of only small or medium size, and are of a species that have little value to man. As a lumberman, he is admirable; for he prevents forest fires, he leaves no high stumps, and he manages his tract so that the next beaver colony finds more timber and better conditions than did the first one.

Protection of Beaver in Wisconsin

By F. B. MOODY

Of the State Conservation Commission of Wisconsin

THE beaver, one of the most wonderful creatures in the animal kingdom, who was the pioneer lumberman, engineer and architect on this continent, has entered upon a new industry. He is now trying to regulate and manage a railway in Wisconsin. An official of the Chicago, Milwaukee and St. Paul Railroad has had to apply to the State Conservation Commission for relief from an artificial lake that a colony of beaver has created upon the main tracks of the railroad between Harshaw and Goodnow by damming Bearskin Creek.

The beaver might even be considered a shrewd lawyer, for, although he is interfering with the passage of the United States mails and delaying interstate traffic, he seems to know that he is secure in his person from attack or arrest, just like a member of a legislature during a session, and he calmly proceeds, without the shadow of a franchise, to build and maintain a dam, and also to walk, loiter and be upon and along a sacred railroad right of way.

It is perfectly evident that the beaver will have to get into politics soon, and will probably need to be represented in the Wisconsin Legislature. It is not known just what his political affiliations will be. The railroad interests find it difficult to decide whether the beaver is more of an ultra-progressive or a standpatter. Although he works a good deal in the dark, some consider his

methods decidedly Rooseveltian; and, again, he seems to be a staunch upholder of the Wilson policy of preparedness.

Possibly the beaver knew that the United States Government reserved the flowage rights on many of the Government lands that were sold; or possibly they represented the fact that, although they were there first, the railroad corporation, without consulting the community at all or securing any authorization, laid its ties and rails right where the beavers' city planning commission had always intended to erect an elegant four-story swimming hole. At any rate, a great clashing of two public interests is imminent, and, so far, the hero of Cameron Dam has nothing on the beaver.

The wonderful knowledge and industry and perseverance of the beaver have won the enduring interest and admiration of man. As an engineer, he so wisely selects a narrowed place in a stream for his dam, a site with good banks. If the stream channel is very wide, he accepts the inevitable and curves his dam upstream against the current. Then the wonderful, patient labor of cutting his logs, getting them down stream and placing them, of swimming again and again, with his little load of mud or stone clasped to his body with forefeet, to chink in the dam. He is mason as well as engineer and builder, and even a landscape architect; for he

brushes in his dam with pieces of tree branches that often take root and grow, such as willow, birch and alder. In time these form a hedge or timbered ridge. Dams have been found that were a quarter of a mile long

so that the next beaver colony finds more timber and better conditions than did the first one.

He prevents fires by lopping tops and branches, thus destroying his own slash, and also by creating a lake that forms a barrier to fires and perhaps by cleaning out the timber along the canals that he digs, which extend up into timbered areas.

The beaver is a true conservationist. The trees that he takes and cuts up to store away for a winter food supply are of only small or medium size, and are the species that are of little value to man. Moreover, the broad lake above his dam is a great bowl that holds the soil washed in, and ultimately becomes a level, fertile tract, supporting a fine growth of timber. So the beaver takes only the poorer trees and near to the water. Wherever he cuts his timber he must first make a waterway by lake or canal, and wherever he makes his waterway he is laying the foundation for level, fertile valley and fine forest. In fact, it has been found that a large part of the fertile meadows and bottom lands east of the Mississippi are the result of his indefatigable industry.

And all of this work is merely incidental to his making a living. He builds the dam to make a lake, and thus secure a safe depth of water over the entrance to



BEAVER DAM ON BEARSKIN CREEK, WISCONSIN

As an engineer, the beaver wisely selects a narrow place on the stream for his dam, a site with good banks. If the stream is very wide, he accepts the inevitable and curves his dam upstream against the current. Dams a quarter of a mile long and seven feet high have been found.

and seven feet high, and beaver canals have been excavated back into the woods to a distance of 200 feet and with a width of 3 feet and depth of from 18 inches to 2 feet.

Like the settler in the West, the beaver lives in a dug-out for the first year or two after he settles in the country; that is, he makes a burrow in the river bank. Then he fells his timber and builds a house, cutting his logs about 6 feet in length; and a wonderful house it is—a wigwam of logs and brush, cemented with mud just before freezing weather begins, so that it becomes impregnable to attack from other animals. Its entrance is through the floor and from the water. Each family of from four to eight beaver has its own house, and each individual its own bed in a dry place at one side of the room. In the center of the room the beaver eats his food, brought up from the water depths, carefully clearing away all refuse afterward.

As a lumberman he is admirable, for he prevents forest fires, he leaves no high stumps, and he manages his tract



A BEAVER HOUSE

This is made of logs about six feet in length and of brush cemented with mud just before freezing weather begins, so that it becomes impregnable to attack from other animals. Its entrance is through the floor and from the water.

his house. By means of the lake he transports the timber for his house and for his food, and in the lake, which must be deep so that there will be water below the ice in winter, he stores his winter supply of food, sections of trees from which he can strip and eat the bark.

Now and again the flowage from the beaver dams affects the land of some farmer or damages some enterprise, and as the beaver are protected animals under the State laws, relief can be had only by destroying their dams. This often gives only temporary relief, for the beaver hasten to rebuild or repair the dams, and it is really pathetic to see such monumental industry exercised for naught, as the dams are again destroyed.

The problem is to protect the few scattered individuals whose business undertakings are damaged by beaver and at the same time to preserve the few remaining colonies of this highly interesting animal, which once ranged the continent in large numbers from coast to coast.

It is certainly discouraging to a poor, hard-working beaver to have his rights as a squatter disregarded. The famous Hustling waterpower act, which was said to have stopped waterpower development in Wisconsin, failed to block the development of beaver dams, but now that the State Conservation Commission may insist on fishways in beaver dams and the State Railroad Commission is likely to require boat hoists in new dams and to establish benchmarks to regulate the water levels, it looks as if the game wasn't going to be worth the candle for the poor beaver, to say nothing about his difficulties in getting an indeterminate franchise.

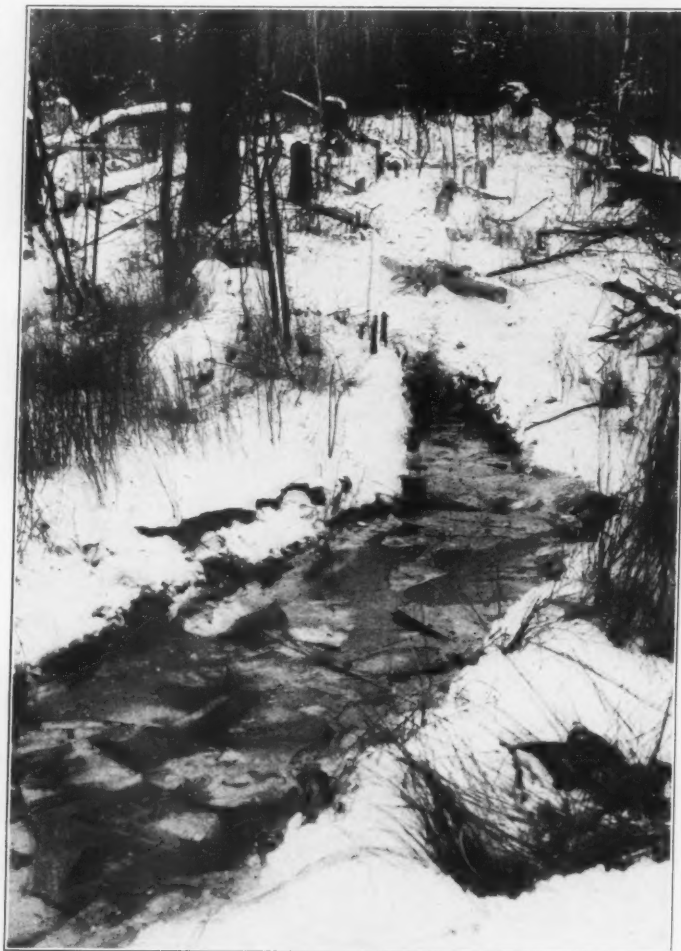
The State Conservation Commission of Wisconsin is investigating the best methods of catching and transporting beaver alive, with a view to removing them from localities where they are damaging private property to some selected area in the State. It is certain that the majority of the people want the beaver colonies preserved, even if a few farms have to be purchased to protect the animals in their activities.

In New York it was believed for a number of years prior to 1904 that beaver had been exterminated. However, there were perhaps twenty left in the lake region

south and west of St. Regis Mountain. In 1904 the Legislature appropriated \$500 for purchasing beaver to restock the Adirondacks. The next spring six beaver were secured from the Canadian exhibit at the Louisiana Purchase Exposition and were released on Moose River and Big Moose Lake. In 1906 fourteen more were procured from Yellowstone National Park. In all twenty-one beaver were released by the State and several by private citizens.

In 1910 sixty families of beaver were known to be scattered through the Adirondack region and were breeding rapidly. For the last three of four years reports show that the beaver are continuously increasing, and some reports of damage to private property have been coming in. In some instances it was found necessary to disturb the houses of the beaver so as to cause them to seek new quarters. In one case 140 rods of fine woven wire fencing were placed by the State to keep the beaver from cutting poplar trees on the land of two private owners. The fence proved a success.

Wisconsin has not imported any beaver, but has protected them by law for twelve years. There are not large numbers yet, but from time to time reports come in of damage to private property through flowage from beaver dams. While this damage is real in some instances, first



BEAVER CANAL TO A CREEK

Wherever the beaver cuts his timber he must first make a waterway by lake or canal, and wherever he makes his waterway he is laying the foundation for level, fertile valley and fine forest. It is found a large portion of the fertile meadows and bottom lands east of the Mississippi are the result of his indefatigable industry.

and last the beaver colonists do more good than harm, improving the country rather than damaging it.

Two very high tributes have lately been paid the beaver as a desirable citizen—one by the county judge of one of the northern Wisconsin counties, and one by the land commissioner of a large and wealthy lumber company of northern Wisconsin, as follows:

"Personally, and generally speaking, I am opposed to the extermination of our wild life. I think a good deal of the beaver, especially for the following reasons, among others:

"They furnish one of the very best examples of co-

operative industry and perseverance, backed by foresight and good sense; and I believe our children of the present day may well be acquainted with their work and habits. My own boy, going on ten, has been very much interested

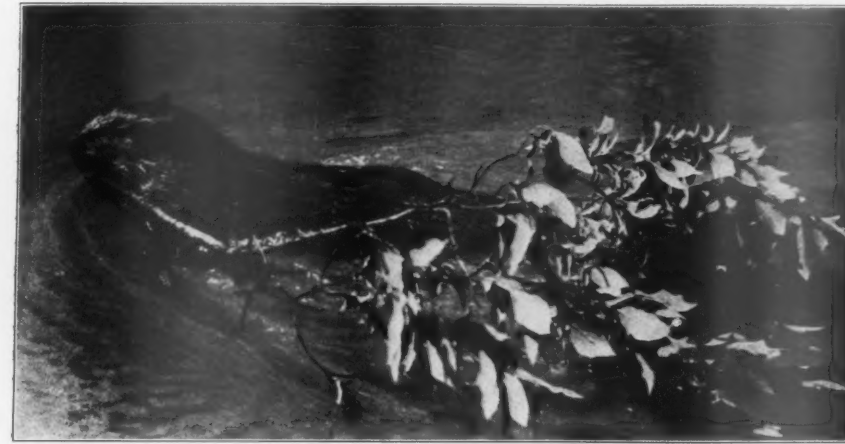
the best class has enjoyed looking over their work.

"But for the present and for many years to come I am in favor of their absolute protection, so far as may be possible, excepting only in particular localities where they are doing real damage. Where they flood lands which the owner really desires and intends to use, or where they persist in flooding highways and bridge approaches, they must, of course, go.

"It must be borne in mind, however, that many complainants have no real use for the land, over the flooding of which they express such deep solicitude, and simply want to start a howl that will lead to their being permitted to trap the animals; and, in fact, in my opinion, most of the 'holler' comes from that class or from men who are easily convinced by and repeat the noise."

The Land Commissioner writes as follows:

"The beaver actually causes but very little damage to the farmer on account of flooding agricultural land. The lands flooded by beaver dams are always swamp lands, and in all cases have been flooded by beavers before there were any farmers in this country. The writer does not know of a single instance where actual damage is being done to agricultural land.



Photograph by courtesy of "All Outdoors."

A BEAVER AT WORK

By his industry and perseverance, the beaver has won the enduring interest and admiration of man. His wonderful, patient labor of cutting his logs, getting them down stream and placing them, of swimming again and again with his little load of mud or stone to chink the dam sets a good example for all of us.

in what he has seen of their activities, and the things I have told him of their habits; and I figure he has gained some good, sound ideas that will help him.

"Then, again, the beaver help a lot by clearing the land along streams, not only by the actual falling of worthless brush and small trees, which means that most of the undergrowth decays, root, stock and branch, before the settler ever gets to clearing the land, so that there is that much less work to do, but also by the flooding of the land, which in itself kills the small growth on the land flooded, with the same result. And in a country like this, this is a much more important consideration than many might think. No doubt you have observed for yourself in your trips up here the many acres of good hay meadow that were originally cleared by the beavers, and which need only to be burned over occasionally to keep them clean.

"And, of course, as the beaver increase, the State has a larger and larger potential investment in valuable fur.

"Of course, it must be admitted that the beaver is not a 'game' animal, not being considered good to eat, and not being the subject of pursuit by sportsmen, although many an outer of



AN EXAMPLE OF CLEAN CUTTING

This shows how the beaver cuts his timber. This cutting has not been removed. He leaves no high stumps, lops off the top and branches, and uses the slash as well as the logs. He also, by creating lakes and canals, establishes fire barriers which have been found of great service in fighting forest fires.

"No damage is being done by beaver to *timber* anywhere. The animals cut down small poplars and eat the bark. This is not marketable timber. The dams do not flood and destroy marketable timber, because the lands flooded are swamp lands and have been flooded by beavers before, and not a tree grows upon the land that can be killed by flooding except willow and alder brush and small second-growth poplar.

"Nine-tenths of all complaints have originated from people who merely want the privilege of trapping and selling the fur. Great numbers of beaver have been killed in this country during the past few years, and the fur shipped out of the State and sold. It is hardly fair to call it trapping, because instead of traps dynamite is used with which to slaughter the defenseless animals while their houses are frozen.

"Forest fires are the greatest menace and drawback to the prosperity of this country, for the farmer as well as the lumberman, which confronts us today. *In unsettled districts the beaver is the only fire-fighter* and the only protection that we have. Their dams, which have been built along small streams, have had the effect of raising the water level in this part of the country on the creek bottoms and marshes, which form most effective barriers against fire. In some cases these barriers extend across entire townships.

"Until within a few years ago there were no beaver in the country, and the water level lowered over three and one-half feet. This had the effect of draining the swamps so that the front went down below the roots of tamarack and cedar timber.

"Such timber did not begin to leaf until as late as the month of August, and finally began to die from want of nourishment. Since the beaver came back no tamarack or cedar is dying; their dams protect us from fires and floods; the waters of the country have been conserved, and we have had no drouth.

"There are large lakes in this country that would be dry were it not for the work of the beavers a century ago. The Government surveyors meandered lakes in many places that became dry land after the early trappers had destroyed the beaver. We hope the time will come when the beavers may reconstruct such dams, and there is plenty of room for all the farmers and all the beaver. We want both, and we assure you that there are just as

The beaver formerly existed in enormous numbers across the whole American continent from the Atlantic to the Pacific. Today they exist in a few localities—but in very small numbers—from the Rio Grande, in Texas, northward through the mountain regions to the limit of trees, and southeastward through Canada to northern New England. Ten years ago it was estimated that there were about a thousand left in Colorado. They are present in a few localities in Wisconsin after having been protected by law for twelve years. In Europe there are so few of these animals left and they have to live under such unusual conditions that they have lost their natural habits.

The flesh of the beaver was formerly esteemed for food and a substance called castoreum was taken from the animal, but the reason for trapping and killing such enormous numbers was the demand for the skins for furs and for the making of beaver hats.

These animals do much more good than harm, and when it was found that their numbers were decreasing with startling rapidity, some of the states began to afford them protection by law. In 1904 the beaver was considered extinct in the following states in which it had formerly been found:

Alabama	Kansas	Ohio
Arkansas	Kentucky	Pennsylvania
Delaware	Maryland	Rhode Island
Georgia	Missouri	Vermont
Indiana	New Jersey	West Virginia
Iowa	North Carolina	

Protective legislation has been enacted in several states.

many people who are land owners that want the beaver protected as there are people who are not land owners and who want the innocent creatures destroyed."

An experience in Canada demonstrates the truth of the observations in the two letters quoted. The inhabitants of a certain district complained to the government of damage that beaver were doing. When the government authorities arranged to capture and remove the beaver a protest against such action was sent. This protest was signed by some of the very individuals who had made the complaint. Here again it was evident that men wanted to trap beaver, and, failing in this, they were anxious to have the animals left in the locality.

A LARGE CLASS

REGISTRATION for the second semester of the College of Forestry at Syracuse has just closed, with 261 men and 1 woman registered as applicants for the degree of Bachelor of Science. No special students are accepted

in the college at Syracuse. Already twenty-five men have signed up for the year of practical work in the State Ranger School, at Wanakena, which opens the first Tuesday in March. Out of the thirty-five men who have been graduated from the State College of Forestry at Syracuse, twenty-eight are in some phase of forestry work. It is not expected that 80 per cent of its graduates will continue to go into forestry, and yet this answers, in a way, the question which is commonly asked as to what men who are going into forest schools may do.

ARBOR DAY IN WASHINGTON

ARBOR DAY in the State of Washington is April 14. On this day much interest will be manifested in forest and bird life through exercises conducted by the various public schools throughout the State. The State Department of Forestry has suggested to teachers and children that the forests may be considered an inheritance given mankind for use, not for destruction by fire; necessary for health, happiness, beauty and service. Health by the purification of the atmosphere; happiness in the home of which some part is constructed of forest material; beauty in the forest verdure; service in the industrial development of the forest resources; and of revenues derived from the sales of timber on school lands belonging to the State of Washington.

The 1915 Forest Fire Season

BY ALLEN S. PECK,

United States Forest Service

THE past fire season on the National Forests, while not so severe as either of the two extremely dangerous years, 1910 and 1914, was in many respects an extraordinary one, and on quite a number of forests tested the efficiency of the protection forces quite as severely as did either of the two abnormal years. The snowfall last winter was generally deficient, except in the Southwest, where it was much heavier than usual. Lack of rainfall throughout the Northwest and on the Coast made a dangerous season alarmingly probable, but late spring and early summer rains remedied the situation, so that it was unusually late in the summer before conditions became especially serious. In the Southwest, after a late start, dangerous conditions continued until the third week in July, when the situation was relieved by the coming of the summer rains. In the Central Rocky Mountain region, while the season started later than

usual, conditions were such as to make possible on one of the Wyoming forests, about the middle of July, the most dangerous fire recorded in that district. In Utah and southern Idaho the fire season was the longest of any in the history of District 4, fires occurring as late as November.

Thus the season throughout the West was characterized by unusual length, which resulted in many fires, in spite of the late start. On the eastern forests and purchase areas in the White Mountains and Appalachians there is very little fire hazard in the summer, most of the fires occurring during the winter months. The total number of fires in the National Forests and purchase areas during the calendar year just closed was something over 6,000, as compared with 7,108 for the year 1914, and a normal annual number of about 4,300. Eighty (80) per cent of the total number of fires were



THE HIGHEST FIRE PROTECTION STATION IN THE WORLD

Recently the United States Forest Service established a permanent fire lookout station on the peak of Mt. Hood, in the Oregon National Forest, where the observer, at a height of 11,255 feet, was able to pick up many fires which would not have been visible to lookouts located at lower altitudes and much nearer the fires.

successfully held by the regular protection forces within an area of ten acres, only 1,200 fires exceeding this acreage and doing any material damage. In District 1, comprising the Montana and northern Idaho forests, where the season was comparatively short but very severe, only 7 per cent of the fires burned over more than the ten-acre limit. While the percentage of fires held within this acreage is considered to some extent as a gauge of efficiency, it is not altogether fair, since the fire-



FIRE LOOKOUT STATION ON THE MOUNTAIN SUMMIT IN THE SHASTA NATIONAL FOREST

Last year four fires out of every five on the National Forests were put out before they had burned over ten acres. Adequate protection of these great wilderness areas depends on continued national ownership.

fighting expenditures are regulated, so far as possible, by the value of the resources threatened and the risk of the fire spreading beyond ultimate control; in other words, a smaller force is used and less money spent in attempting to suppress a fire burning in brush cover which has little value than in the case of one located in valuable timber. This obviously results in the burning over of considerable acreage of brush and open country, which could be greatly lessened through the expenditure of more money, if this were felt to be justified.

The total area burned over during the past season in the Western districts was 235,000 acres, or an average of 40 acres per fire. This compares favorably with the average area of 60 acres burned over the previous season. Preliminary estimates of the damage done indicate that it will be but about \$280,000, as against \$500,000 in 1914, and a loss of nearly \$15,000,000 in 1910, when approximately the same number of fires occurred as during the past season. Comparatively little timber was burned in the past year, except in the forests of Oregon and Washington, where 80 per cent of the total loss occurred. District 6, which comprises the forests of these two States, had more than one-fifth the total number of fires. The extraordinary duration of the danger period in the Northwest is well shown by the fact that while the peak of the fire season usually occurs by the middle of August in that district, it was not reached this

year until well after the first of September. The total of 579 fires reported during the month of September exceeded by 32 the total number recorded during all previous Septembers from 1908 to 1911, inclusive. In California the fire season was not considered as closed until November 10, after a period of over five months, during which it was necessary to keep the forests manned



FOREST RANGER PACKING SUPPLIES

It is a long, hard climb to the top of Mt. Hood, and the supplies for the observer in the fire lookout station there have to be taken up on horses or mules. The forest ranger here shown is about to start with a pack train for the top.

with protection forces, in addition to the regular year-long personnel.

Reports thus far at hand indicate a very marked increase during the past season in the percentage of fires traceable to lightning. Over 40 per cent of the fires during the year just ended are attributed to this cause. In the Montana and northern Idaho forests 60 per cent of the fires this year were caused by lightning. In 1914 lightning and railroads caused approximately an equal number of fires in this region, amounting together to 70 per cent of the total number, whereas in 1915 less than one-tenth of the 970 fires which started were traceable to



ON TOP OF MT. HOOD

The fire lookout station, built by the Forest Service at an elevation of 11,225 feet, where the observer can pick up fires which are not visible to observers at lower altitudes who are much nearer to the fires.

railroads. On the California forests the number of man-caused fires showed a substantial decrease compared with previous years. In view of the increasing use of the California forests, both by the residents of that State and by tourists, this showing is very satisfactory, as it indicates that the aggressive campaign of education in the matter of fire protection which the Service has been pushing for a number of years in California is having tangible results.

When, a year ago, Congress was asked for a deficiency appropriation to meet the expenditure of nearly \$700,000 for fire fighting during the season then closing, it was pointed out that that year had been more dangerous and severe from the standpoint of fire hazard than any previous year in the experience of the Forest Service, with the possible exception of 1910. That greater loss was not sustained and greater expense not incurred was due very

largely to the fact that the field force of the Service was better organized to meet the situation than it had been in any previous year. During the past season, with five-sevenths the number of fires that occurred the year previous, only \$207,300 was spent, while the average cost per fire was but 40 per cent of the 1914 cost. This is in addition to the cost of fire fighting done by regular officers and special protective summer forces on the National Forests.

This extraordinary drop in the cost of fire suppression is undoubtedly due in part to the fact that in the regions of highest hazard fires occurred later in the season than usual, when the days were becoming shorter and the nights cooler. Other factors, however, are the continued development of permanent lookouts for detection and the use of firemen, or "smoke-chasers," who are stationed at strategic points during the dangerous periods and are at all times ready to go to a fire on instant notice. Preparedness pays in fire protection. Quick detection and swift attack by a regular or two often saves a long, expensive fire fight with a hastily recruited crew of volunteers. One especially notable development in detection this past season was the use of Mount Hood, on the Oregon National Forest, as a permanent lookout station. At a height of 11,225 feet the observer at this lookout picked up many fires which were not visible to lookouts located at lower altitudes and much nearer to the fires. A substantial cabin has been built on the summit for use next season, and the demonstration of Mount Hood's efficiency may result in the testing of some of the other higher peaks in the Northwest.

COST OF MAPLE SUGAR

IN a few days the Department of Utilization of the New York State College of Forestry will inaugurate some experiments at the Forest Experiment Station, at Chittenango, with an idea of determining the cost of production of maple syrup and sugar with reference to the small sugar bush, such as is often found in the small farmer's dooryard. It is proposed to ascertain as definitely as possible whether it will be worth while for the small farmer to indulge in the tapping of the dozen or so trees that he may have around his house. The profitable utilization of such small groves may very probably reduce the bills at the grocery store.

FOREST PLANTING IN VERMONT

THE report of the State Forester, recently published, shows that the interest in forest planting is still increasing in Vermont. More people planted trees in 1915 than in any previous year. Altogether over four million trees have been planted in the State by about 500 people since the establishment of the Forestry Department. In order to give a better idea of what this number really means it may be said that the trees are planted in rows 6 feet apart, and there are, therefore, about 4,500 miles of such rows in the State.

Ornamental and Shade Trees

A Department for the Advice and Instruction of Members of the American Forestry Association

EDITED BY J. J. LEVISON, B.A., M.F.

DAMAGE BY SPURS

By JOSEPH L. RICHARDS, B.S., M.S.F.

NOBODY loves a lineman." At least, that seems to be the case among people who appreciate the beauty and utility of roadside trees.

Certainly, great numbers of the men in that trade have done much to create this undesirable situation. On the other hand, neither the men of the wires nor the policies of the public utility companies which employ them are entirely to blame for the condition of the shade trees that have stood in the way of electrification. In many instances the tree-loving public has blustered much and done little to supply the means of preventing damage to their trees from this cause. Too often it has relied upon legislation instead of cooperation.

In communities where a municipal arborist is able to keep the wires clear or assist in doing so by detailing the city's trained tree men to work with the line gangs and do all the tree climbing, much damage and discord is avoided. Such arrangements keep men who have neither the training nor the equipment for doing scientific tree work, and whose feet are shod for climbing dead poles, out of living trees. Every wire-stringing public utility company will maintain that it is unreasonable to require it to supply to each of its line gangs the arborist's outfit necessary to do proper tree work. The great majority of them, however, will agree to cooperate in undertakings that will free them from the interference of trees either by planning the arrangement of the trees and wires on the highways or by proper training and care of the trees.

For several years a number of tree wreckers were at large whose activities were nothing short of criminal. Even the excuse of the necessity for maintaining right of way for transmitting messages and power was lacking for the damage which they did in the localities where they operated. These men represented themselves to be tree trimmers. After securing the assent of an owner they proceeded to butcher his trees and trim his pocketbook. The tree trimming consisted of stubbing off the branches without taking any precautions against decay which the arborist takes when he cuts back a failing old tree in order to reduce its top to correspond with the lessened efficiency of the root system and so prolong the life of the tree for a few years. The amount which the trimmer cut off depended largely upon his daring. The size of the stubs left was directly proportional to his caution or fear of falling. In some places, docked trees became stylish, and as a result of this service, the trimmed trees sprouted vigorously for a few years and

then began to fall apart owing to the decay that had gotten in through the unprotected wounds.

The difference between the tree trimmer who uses climbing irons (i.e., lineman's spurs) and the vandalistically inclined lineman is only one of degree. The tree



WOUNDED BY LINEMAN'S SPURS

Section of trunk of Norway Maple, showing 4-year-old wound started from two adjacent spur-marks, both of which are visible. Note the crack through the lower one caused by the drying out of the exposed wood. Cracks like this one hasten the entrance of heart-rots.

trimmer that uses spurs is a strange contradiction. He is in a class with the M. D. who treats a wound and then pricks his patient in several other places with unsterilized instruments.

To get the force of this comparison it is necessary to recall the structure and physiology of trees and point out their relation to the disease organisms which attack them.

For the purpose of discussing the effects of wounds upon the life of a tree its stem may be considered to consist of five components, each completely surrounding its axis. Naming them from the inside outward, they are heartwood, sapwood, cambium, live bark and dead bark. Sapwood, cambium and live bark are always present, even in the smallest twigs. The heartwood and dead bark develop as the stem gets older.

Heartwood is formed from sapwood by the deposits of waste compounds which accumulate in the older cells and kill them. These waste products have preservative

ing or by a coating plus a filling which new growth may cover over and seal up inside the tree.

The live cells of the sapwood contain more moisture and less of the preservative compounds found in the heartwood. The fungi which thrive upon them are more rapid growers. New wood is attacked readily. A small wound exposes the sapwood to infection, so that discovery often comes too late. The sapwood, as its name may suggest, is the part of the stem that carries the sap or water supply of the tree from the roots up to the leaves. When it is attacked by a fungus, the water supply of the branches which are dependent upon the sap currents that formerly passed through the diseased tissue is cut off. Then their leaves wither on the twigs and the branches die. If a sap rot encircles the trunk the whole tree dies.



AN OPENING FOR DISEASE

Trunk of chestnut tree showing effects of chestnut bark disease which entered through the spur-mark slightly above and to the right of the center of the picture.

properties which make the heartwood relatively resistant to fungi and other agents of decay. Nature has evolved fungi adapted to living upon heartwood. They are comparatively slow-going so that considerable time elapses before the growth of the rot overtakes the growth of new wood outside. When it does, the tree either dies slowly from inability to supply its leaves with moisture or is so weakened that it breaks to pieces. The wounds through which the heart-rot fungi get into the wood are usually large enough to be easily detected. If a heart rot is discovered in time it can be gouged out and the sound wood protected from further infection by a preservative coat-

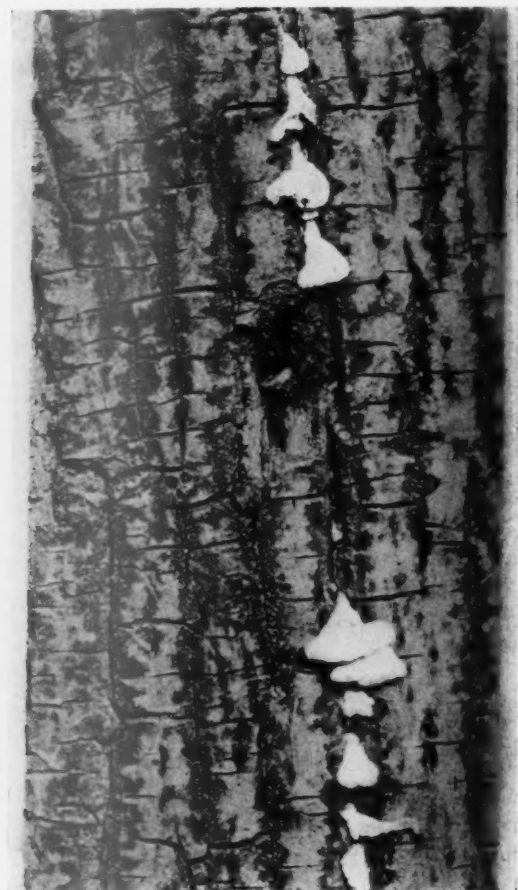


Photo by Alfred Macdonald

DEVELOPMENT OF WOUND

Wound surrounded by a fungus (*Schizophyllum commune*) caused by spur injury.

The cambium layer between the wood and the live bark is by far the most sensitive part of the tree. Its individual cells are as delicate as those of the tiny shoots inside the buds before nature has prepared them for exposure to the outside air. One has only to peel off a bit of bark in the spring and see how quickly both the outside of the wood and the inside of the bark change

color to realize how delicate and sensitive the cambium is.

The live bark is made up of a number of different kinds of cells each having their own functions. Some are long, thick-walled and tough to give the bark the necessary strength. Others are specially formed to conduct the plant foods manufactured in the leaves down to the roots and trunk, where they may be used or stored. There are grit-cells to impede the progress of boring insects, and layers of succulent active cells which, when the time comes, produce layers of cork. These layers of cork are impervious to water. The new layers of cork repeatedly cut off, from water and food, eventually produce the patches of dead bark.

The dead bark acts as a mechanical protection to the vital parts of the tree. It is constantly sloughing off and being renewed from within. The fungi which attack it are effectually excluded from the live bark by the inner cork layer.

The fungi which attack the live bark and cambium are diseases of the active succulent tissues. They are known as bark diseases. They cause the death of the inner bark and cambium and the separation of the bark from the wood. These fungi spread most rapidly through the cambium, because it is made up entirely of delicate, thin-walled, active cells. In the live bark, their progress is impeded by the woody fibers and the grit cells. Once they reach the cambium they use this vital layer, in which all new growth of wood and bark originates, as their line of communication and base of operations and strike out from it into the adjacent tissues as they spread up and down and around the stem. As they spread around the stem, they cut the connections which carry the food compounded in the leaves down to the roots. The roots dependent upon the diseased portions of the bark are starved out and cease to gather moisture for the parts of the tree which they formerly supplied with water. As in the case of the sap rots, when a bark disease encircles the trunk the death of the entire tree results.

All of these fungi, heart rots, sap rots, bark diseases, and those which act in more than one of these capacities are carried from tree to tree by microscopic bodies called spores. The spores are the seeds of the fungi. Great numbers of these spores are produced, and many of them drift about in the air without finding a good place to germinate. All the heart rots and sap rots fail to get a foothold unless they settle upon the wood exposed by a wound in the bark. The disease of the cambium and live bark must find an entrance which reaches past the inner cork layer and leaves these delicate tissues without effective protection. Thus every unprotected wound greatly multiplies the chances for the development of one or another fungous diseases.

For this reason, the arborist protects all openings in the bark of the trees by disinfecting them and waterproofing them as well as possible. Coal tar has disinfectant as well as waterproofing properties so that it is generally used for these purposes. More effective compounds are being sought for each of these uses. In any

case, the protection should be inspected at least annually and renewed at intervals until the new growth or callus which starts from the cambium around the edges of the wounds closes them.

Where it is worth while to take these precautions against invasion by fungi, it is worth while to see to it that neither "tree doctors" nor linemen are allowed to clamber over the trees and poke the bark full of little cuplike holes especially suited to catch the spores of fungi and to conduct them directly to the susceptible tissues. Spur marks are shaped like three-cornered funnels, with the point down, and usually reach to the sapwood.



PROGRESS OF DISEASE

Chestnut log showing rings of bark-disease fungus about spur-mark from which the growth started. Each ring marks the limit of a season's growth.

Not very often, but still in an appreciable number of cases, spurs open the way for heart rot. Figure 1 shows a wound in the bark of a Norway maple caused by spurs. The season during which the spurring occurred was evidently a dry one, for the cambium dried out around the wounds and the process of healing started before any bark or sapwood disease got a foothold. The exposure of the wood caused it to dry out, shrink and crack at the surface. The crack exposed still more wood to drying out. The drying out of the live wood kills it. Heart rots live on dead wood. Thus do spurs open the way for heart rot.

The spur wounds that happen to result in the drying back of the cambium without immediate fungous infection have in them the probability of other bad results. While working on a fine old elm on which the owner had previously spent considerable money, an arborist noticed numbers of light-colored streaks like those which are common below old wounds, but which at a little distance appeared to come out of sound bark. These streaks proved to come from pockets under the dead bark caused by the drying back of the cambium around spur wounds.

The pockets were inhabited by a kind of borer that feeds upon the sap which it gets from the tree by irritating the delicate skin of the callus. The streaks are formed from the surplus sap which, mixed with the excretions of the borers dries on the bark as it runs down the outside of the tree. These borers multiply very rapidly. Their eggs are blown about by the wind in much the same manner as fungous spores. Close examination of the bark disclosed numbers of similar dry pockets which harbored all sorts of insect life. Most of the pockets were about four inches long and two inches wide. One caused by a single spur prick was nine inches long and three inches wide. Healing had been going on four years. The greater part of the damage to come from these wounds had been done or was already brewing. In all probability there were not less than two hundred of these pockets on that hundred foot elm. It would have taken three men at least two days to go over the tree and hunt out and treat all these wounds. This case of spur damage to elm is by no means unique. In one Massachusetts town damage of this sort was called to the attention of the tree warden by a telephone lineman. Oak and ash suffer in the same way.

In the formation of such pockets, the loss of sapwood and bark impairs the circulation of the tree and reduces its vigor. The loss of sap through the feeding of the grubs is a further drain upon its vitality. The insects, hiding in the pockets where the birds that patrol the crevices of normal bark do not get them, eat the leaves and so reduce the supplies of plant food needed to repair the damage. In this way, even without infection, the odds against the life of the tree accumulate from these inconspicuous wounds.

When the fungi that attack the sapwood, cambium and live bark cooperate with spurs, the damage is quickly, stealthily and thoroughly done. Figure 2 shows a sample of the results of spurring followed by sap rot infection. The triangular opening in the bark, to the left of the crack from which the fungus brackets protrude, is a spur mark.

The upper sides of several limbs of this Norway Maple were spur-marked every few inches for from eight to twelve feet. Almost every spur mark was a center of infection. The entire upper side of each of these limbs was dead when the withering of the leaves and the appearance of the fungus brackets disclosed the injury. The damage to the tree was too widespread to be remedied.

The fungus which did this damage is a common native species that attacks wounds on many of our broad-leaved and evergreen trees. There are many others with similar habits which mycologists consider more dangerous.

Maples are relatively thin-barked trees. Infection of thick-barked trees through spur marks would seem less likely. Unfortunately, thick bark is not uniformly thick. The crevices afford better holds for spurs than the ridges do. Even on old thick-barked trees, where the dead bark is tough enough to hold and thick enough at the base

of the trees to keep spurs from reaching the live tissues, the bark on the upper part of the trunk and upon the branches is relatively thin.

Chestnut is a fairly thick-barked tree. The one shown in Figures 3 and 4 had been failing noticeably the summer before it was examined. That spring the new leaves on several large branches had dried out when only partially expanded. Those on other branches were dwarfed. The bark over a large part of the trunk, within reach of the ground, sounded hollow. The first patch of it which was removed disclosed the conditions shown in Figure 3. Near the center of the dead area there was a dimple in the wood which corresponded with a spur mark in a crevice of the bark. The spur appeared to have only just pierced the cambium, for the wood was deformed but not splintered. About this dimple was a series of bands of the fungus known as Chestnut Bark Disease. On the other side of the trunk was another dead patch which came from a spur wound (Figure 4). In this case the spur penetrated the sapwood and splintered it. The rings of fungus growth show clearly how the disease spread from the jab. In five seasons, unheralded by any outward signs, the fungus had grown more than a foot around the trunk and several feet lengthwise. The damage from the other wound was even more extensive.

The upper sides of the lower limbs of this tree were honey combed with spur marks for a foot or so from the trunk. There was no thick bark there to prevent each jab from puncturing the cambium. One hundred and fifty would be a conservative estimate of the number of spur marks on the tree. The infected branches had, of course, been encircled by the fungus and their sapwood had dried out. Under the circumstances the only question which could arise as to the fate of the tree was whether it should be removed by inches or all at once.

From what has preceded, it is evident that when used on living trees spurs can cause heart rot, disfigure their victims superficially, aid the insects and other small animals which attack them, and infect them with sap-rots and bark diseases in so many places at once that treatment is generally futile by the time the damage is discovered. The carelessly used hatchet or saw can not cause any greater variety of tree troubles, and has the advantage of showing the location of the damage done in time for proper treatment.

The arborists in charge of valuable collections of trees, belonging to both public and private institutions, have long appreciated the risks run in using spurs and do not permit them to be used upon their trees. Lay owners, who have learned the lesson through the untimely death of a pet tree, refuse to add to the dangers with which their trees must contend by taking these risks. There are special considerations, such as the economical control of pests upon trees whose replacement by other kinds, less attractive to the insects, would be beneficial, which would justify taking the spur risk. But, anyone desiring to prolong the life of a tree will keep spurs away from it.

QUESTIONS AND ANSWERS

Q. I have been asked to outline a plan for a shade-tree department to systematically plant and care for the city's shade trees. Can you give me an itemized estimate of the probable annual cost of maintaining such a department, including city forester, necessary assistants and material, for a city of 100,000 population. The work needed includes a shade-tree survey to determine the needs, pruning and spraying established shade trees, replacing partly-grown cottonwoods and other poor stock, and making new plantings. About what salaries are city foresters receiving?

F. I. R.,

Coeur d'Alene, Idaho.

A. Generally speaking, a shade-tree commission should consist of five members responsible to the mayor, and appointed on terms expiring in different years so that it may always have among its members someone who has had more or less experience in the work. It should be also allowed certain fixed revenues with which to carry on its work. This may be done by providing an annual tax levy of say three-fourths of one mill tax for shade-tree purposes, and, as has been done in some cases, an additional tax of 10 per cent of all licenses and fines collected by the city. The latter should only be resorted to if the revenue is insufficient. A technically trained forester should be appointed from the start and a set of tree ordinances, such as Mr. Levison has drawn up for the city of Rome, N. Y., long ago, a copy of which we are sending you, should be installed. After this, the forester should be provided with a good foreman, a set of equipment and a crew of at least six men. The salary of the forester should be at least \$1,200 to \$3,000, but \$1,200 is the usual price for a beginner. The annual wages of a foreman will be about \$900, and the wages of the six men will be about \$3,600. In addition to this it will be necessary to spend about \$1,500 on teams, about \$200 on tools and about \$400 on a spray outfit, if conditions warrant it. The cost of material and the trees for the first year will vary with the amount of work done, but \$500 will be least estimate of cost of such work. The cost of the survey should not be included as an item, because that will be done by the forester and the foreman along the lines suggested by Mr. Levison, in the Shade Department in this issue relative to a tree census. If, in working out your system, there are any specific questions you desire to put, do not hesitate, and we will give you our best information, on request.

Q. Please advise what practical method you would advise for taking a shade tree census.

N. R. M., *Harrisburg, Pa.*

A. In Brooklyn, N. Y., a census of city trees was taken ten years ago and consisted of the following method: On one side of a plain card was indicated the approximate location of the trees on the block, using a system of colors to designate good, bad and dangerous trees; those that had a cavity were marked with a small "c," and those that were particularly dangerous, or otherwise

important, were noted with the number of the house alongside of it. Cards were made out for each block and were filed consecutively for each street and the different streets were then filed alphabetically. In this way it was possible to locate any block in the street and tell, in a general way, the condition of the trees on desired block and their approximate location. Whenever there were any trees removed from the city streets, any new ones planted, or any other changes made, it was noted on the card and in that way they kept changing the records and always had the census up to date.

This plan entailed no laborious work such as would be required in the making of maps and, for practical purposes, served better than any formal maps or elaborate sheets would have done; as a matter of fact, it was found that the tree census has its principal value in the beginning of shade-tree work, in helping the tree warden or city forester to acquaint himself with the conditions of trees, their number and the need for additional planting; but after its first or second year's service, the census becomes less and less important until, eventually, it is nothing but a matter of record rather than a practical help in the field.

Q. I am sending you two small branches from the limb of a tree that retains what would seem to be the seed pod of last year, and showing new budding, to ask if you would kindly designate the kind of tree. It is a very much-admired tree, the four or five specimens having been brought here more than 45 years ago, and we have been told it is a cypress. But there are no cypress knees apparent (if there were very small ones, the filling in of the ground covered them) and there is doubt as to the kind. The foliage is as dainty as a maiden-hair fern, and a few of the townspeople have been very anxious for their preservation. A man who bought part of the lot with two or three of the trees, raised the grade, regardless of those valuable trees, and badly injured the bark on one, but so far they have stood even that ill treatment. I have been told some trees stand the raising of the grade close to the tree trunk; is this one?

J. A. T.,

Asheboro, N. C.

A. Replying to your inquiry, would say that the tree of which you have submitted a specimen is a Bald cypress. The knees, which are characteristic in its native locality, are not always present and all the trees of this species which you find in cities do not show these knees at all. The knees are an adaptation for the purpose of absorbing air and are only important in cases where the trees stand in swamps and cannot get the air directly from the roots. The knees, under the circumstances, serve to draw the air above water. On city streets or on lawns, there is no reason for the presence of these knees and consequently they are lost. As to the filling of soil around such trees, I have seen many cases where a slight filling of about one foot or even two feet has not hurt the tree at all, but it is important in all cases to keep the soil away from the bark of the trunk

in order to prevent decay, which may set in in due time. The specimen which you sent shows the presence of the "bag worm," an insect which spends the winter in a baglike covering and which emerges in the early summer and feeds on the foliage. You probably have not noticed this bag worm, and I am, therefore, returning the specimen so that you may see it. If these bag worms are numerous on the trees it is a wise thing to remove and destroy them at once before the mature caterpillar emerges from those winter nests.

Q. We have just organized a shade tree commission in our city and would like to know what to do next towards caring for our trees. H. C. U., Pa.

A. Appoint a city forester or obtain the services of a consulting arborist to make an inspection of the trees and to prepare a detailed working plan for the first year's work. He will soon be able to report on the number and variety of trees growing and extent of work necessary. He will point out the trees and branches that are dangerous and should be removed at once. The control of insect pests, the protection of trees from mutilation by horses, etc., the need of planting new trees and the kinds suitable, the incorporation of a street tree ordinance, etc., will receive his further consideration.

From his report you will be able to determine what appropriation is absolutely urgent for the first year and just how to organize the force of men that will take care of your trees.

ADVICE FOR APRIL

SPRAYING

Prepare for spraying campaign during May and June. It would be well to procure at an early date the following chemicals in proportion varying with the quantity of work to be done: Arsenate of Lead, Whale Oil Soap, Bordeaux Mixture.

PLANTING TREES

This is the month for planting, and the following suggestions on how to plant are of value:

1. Plant when frost is out of the ground.
2. Keep the roots well protected from the minute the tree leaves the wagon or trench to the minute it is planted. Do not take more plants from the wagon than is absolutely necessary.
3. Cut all broken roots and cover wounds with coal tar.
4. Cut back the branches, but do not remove them entirely unless they interfere or are too thick. With some trees like the sycamore, oak or poplar, you can cut back more than with the others. Do not cut the leader, and do not cut evergreens.
5. Let only good soil come in close contact with the roots, and have the good soil well packed around the roots; work it in with the fingers and stamp on it. Place the poor soil only on top.
6. See that the tree is planted upright and firm.
7. Plant the tree no deeper than it stood in the nursery.
8. Water the tree only after good soil has been put around its roots and the hole filled.

CARE OF TREES AND SHRUBS ON ARRIVAL

Before the plants arrive, dig a trench from two to four feet wide, one foot deep and long enough to hold them all.

As soon as the trees or shrubs arrive, untie them, keeping each kind separate, and place the plants in the trench temporarily until they can be set out in their

proper places. Very carefully cover the roots with earth and give a copious watering. In unpacking the plants, in placing them in the trench, or at any other time, be careful *not to expose their roots, even for a moment, to sun or wind, and at all times keep the roots moist.*

In case of evergreens, the slightest exposure is apt to prove injurious.

WHAT TO DO AFTER PLANTING

1. It should be borne in mind that when a tree is transplanted, no matter how carefully the work is done, it is impossible to take up the entire root system, and, therefore, before it is able to care for itself, new roots must be formed to take hold of the soil. In the meantime, the moisture is being continually evaporated from the trunk and branches by the action of the wind and sun, and this must be balanced by an artificial supply. During the dry spells and hot weather of the following season, the soil around the base of the tree, for a space wider than the hole, should be stirred up and watered. **WATERING DURING THE FIRST SUMMER IS VERY ESSENTIAL AND MORE IMPORTANT THAN WATERING DURING THE SUBSEQUENT SUMMERS.** The water should not be sufficient to make the ground soggy. For a tree about 2½ inches in diameter, two pails of water applied twice a week is enough.

2. In the fall a layer of old manure 3 to 4 inches thick should be spread over the surface around the tree to a distance of a foot or two beyond the line of the newly filled hole. This treatment will enrich the soil, shade the ground and help to hold the moisture.

AMERICAN FORESTRY FREE

Have you friends who love trees, woodlands, forests? Send their names and addresses to the American Forestry Association.

A free copy of American Forestry will be sent them with your compliments. Do it now before you forget.

First Fire Protective Organization

By W. R. FISHER

Secretary the Pocono Protective Fire Association

THE Pocono Protective Fire Association, of Monroe County, Pennsylvania, incorporated in 1902, was the first private organization formed in the United States for the protection of the forests from fire, and it stood alone for four years before a second association was organized, in Idaho.

It is said it should have been called a fire protective association, not a protective fire association. But the question of an appropriate name was fully discussed when the association was formed, and the arrangement of words as they now stand was deliberately adopted by the founders.

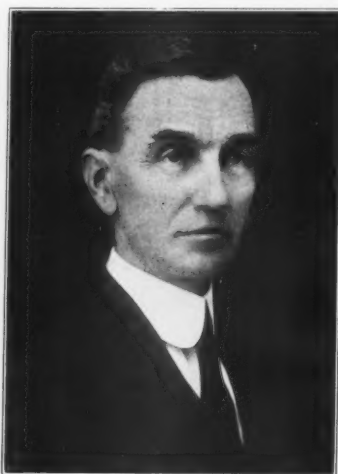
The association had its origin in the office of a railroad company. The railroads have to shoulder so much blame and so much responsibility for damage done to the woods that it is a satisfaction to be able to record the fact that credit belongs to the Lehigh Coal and Navigation Company, of Pennsylvania, for first carrying into successful operation the idea of organizing a group of citizens and banding them together to prevent and suppress forest fires. This corporation owns large tracts of land in other parts of the State, outside of Monroe County. *AMERICAN FORESTRY* for August, 1915, gives an interesting account of recent work by this company in reforesting some of these lands in Carbon and Schuylkill counties.

Another peculiarity that marks the Pocono Protective Fire Association and distinguishes it from other protective associations, is to be found in the character of its membership. Most of the private protective forestry organizations of the country are carried on with the avowed object of preserving the trees as timber for future use. Such utilitarian motives have their influence with some of our members who own large tracts of land, but the greater number have been led to join for esthetic reasons only. Hundreds of people from many States visit Monroe County every

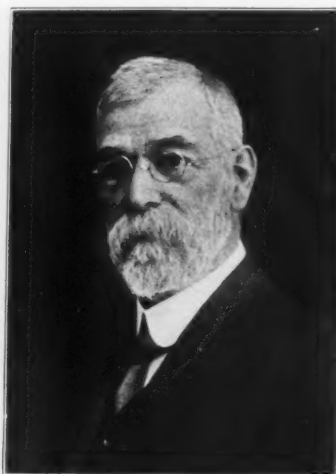
year, attracted by its scenic and climatic advantages, seeking for rest, for sport, for recreation, or for health. Many of these own little or no property in the county, but they are deeply interested in the preservation of the woods as objects of beauty to the landscape, as shelters to game, as protectors of the water supply; and they willingly pay a yearly fee to help on the work of the association. Eight States, extending from Massachusetts to Maryland, have representatives upon its roll of membership, and thus the association widens its influence and helps to spread abroad an interest in forest protection. We have more than doubled our membership during the past year, and now carry 224 names on our roll.

The association has two distinct lines of work—one is to render direct assistance to the State Department of Forestry in fighting forest fires; the other is to keep before the public mind the value of trees, and

to teach the individual what each may do and ought to do to protect the forests from damage by fire. The State is helped by contributions of money for the support of a fire patrol by the erection of observation towers and by printing and posting warning notices about forest fires throughout the county. The educational phase of the work, although less conspicuous than an activity displayed in fighting fire, is in reality more helpful to the State and more productive of lasting results. Practical foresters agree that a ready and willing disposition to respond promptly to calls for fire fighters on the part of the residents in wooded districts is essential to a successful fire service. Little can be done by legislation without a favorable public sentiment to back it. It is the province of associations like ours to develop and to foster this sort of cooperation; for a private association is able to reach the people of a community in a direct and friendly manner, where formal and impersonal methods of State officials

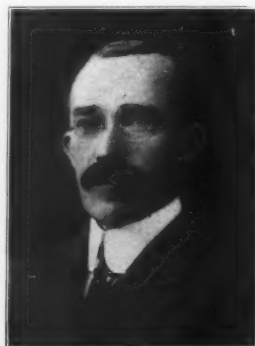


E. A. HOOPES
President



W. R. FISHER
Secretary

The Pocono Protective Fire Association of Monroe County, Pennsylvania.



J. A. SEGUIRE
Vice-President

might not succeed. Most people are entirely ignorant about the forestry problems of the day. Consequently, there is no popular interest in such objects. The public needs information about the frequency, the extent, of forest fires, and the losses that result from them; about the dangers of the careless use of fire in the woods; about the best methods to control and suppress fires, and many similar subjects. Our association is distributing such information by means of articles in the newspapers, by advertisements, and by circulating printed matter of various kinds relating to forest protection.

With the same object in view, prize essay contests have been established in the schools of the county to interest the young people in the forests and to carry into the homes of the people the discussion of the subjects of these essays.

Little by little the foundations of a firm and permanent structure are being laid. Indifference and prejudices are breaking down before enlightenment, and the future prosperity of the association appears to be assured.

The Forest Pleadings

(Arbor Day Recitation For Six Pupils)

By E. T. ALLEN

First Pupil (Carrying Evergreen Branch):

I AM THE FOREST.

I clothe this glorious land
With beauty and on every hand
You turn to me in daily need.
Your best friend I have always stood;
You could not live not using wood.
For our protection now I plead.
Nor do I bid you take my word;
Let these my witnesses be heard.

Second Pupil (Carrying Pail of Water):

I AM THE STREAM.

From my woodland springs
To river mouth where the white gull wings
Over the ships from the ends of the earth
I flow to your homes and mills and fields
And carry the freight that the harvest yields,
But shady forests gave me birth.

Third Pupil (Carrying Pet Animal):

I AM THE WILD THINGS.

I speak for graceful deer
And flashing trout in brook, pools clear,
For singing birds and squirrels pert,
And all the wearers of feather and fur.
What should we do if no forests were
To shelter us from fear and hurt?

Fourth Pupil (Carrying Ax):

I AM INDUSTRY.

To me the forest brings
Reward for labor and all things

That money buys, for in this state

So much of our wage-earners' pay
Comes from lumbering in some way.
The fate of forests is my fate.

Fifth Pupil (Carrying Fishing Rod):

I AM PLEASURE.

Happy vacation days,
Camping, hunting, and all the ways
Of nature in her gladdest moods.
The forest holds for girls and boys
Who love out-doors and wholesome joys—
There is no play-ground like the woods.

Sixth Pupil (Strikes Match and Holds it Burning):

I AM THE FUTURE.

Shall all these pass away?
Must we look forward to a day
Of fire-charred, lifeless, streamless slopes
Where thoughtless match or unwatched brand
From man's ungrateful, careless hand
Has destroyed his own children's hopes?

All (Future blows match out, watches as he drops it, then tramps it out):

FIRE IS OUR ENEMY.

Won't you help us, then?
Learn yourselves, and teach all men,
This, the lesson all must learn:
Put out the campfire and the match;
Careful with slash and clearing-patch;
Leave no fires in the woods to burn.

Electric Power Development in the U. S.

Review of a Report of Secretary of Agriculture Houston to the United States Senate

By H. H. CHAPMAN

THE policy of the nation with regard to its publicly-owned waterpowers is now under consideration by Congress. The many technical difficulties surrounding the subject and the absence of authoritative information have led to misstatements and misunderstandings. This report is peculiarly welcome. Setting forth, as it does, a summary of statistics dealing with the total amount of power of all classes available and utilized, by regions, the rate of development and its relation to demand, it will do away with much superfluous discussion.

The total available waterpower for the United States, owing to dependence on fluctuations of stream flow, is calculated as minimum, representing the capacity during two weeks of minimum flow, and the maximum, given as the average for six months of maximum flow. These figures are, respectively, 27,900,000 horsepower and 53,900,000 horsepower. Of this quantity 31 per cent is located on lands owned by the United States within National Forests in the West. Seventy-two per cent of all waterpower lies in the western or "National Forest" States and of this total, 42 per cent is on national forests. The regulation of publicly-owned waterpower sites is, therefore, a question which intimately concerns the Forest Service.

By far the most interesting facts brought out are the summaries which show the relation of waterpower to the total present developed power from all sources in different States, including steam and gas power. In 1912, power, including steam, water and gas, totalled 30,450,000 horsepower, of which steam generated 24,340,000 horsepower or 80 per cent, and water 4,870,000 horsepower, or 16 per cent, a proportion of 1 to 5. Waterpower in the last three years has developed more rapidly than steam. The increase in primary power for municipalities, street railways, and commercial purposes using in 1912, 11,190,000 h.p., or 36.8 per cent, added 2,770,000 h.p. by 1915, of which 1,668,000 h.p. was waterpower, and but 1,100,000 h.p. steam. But it appears that in every group of States except the western mountains and Pacific coast (containing 72 per cent of all waterpowers) the present total combined power installation already exceeds the minimum capacity of all the waterpower sites, and in five out of seven groups of States it exceeds the maximum capacity of all waterpower that can be developed. This excess, due to steam, and dependent on coal, amounts in New England, the Middle Atlantic States, the North Central and the West South Central States, to 171 per cent of waterpower capacity. Two points are at once clear: waterpower can never

supersede steam power as a whole, and waterpower must always compete with steam in the power market.

Claims have been boldly and repeatedly made that the policy of regulation in force on the National Forests has produced complete stagnation and prevented the development of the waterpowers on these lands. The facts are as follows: In the decade 1902-1912, total combined power installation increased in the eleven western States by 240 per cent, as against 98 per cent elsewhere. Electric power in the entire country increased by 226 per cent, but in the West, by 440 per cent, which was two and a half times as rapid as a per capita increase as the average. Waterpower increased for the country by 98 per cent, and for the West by 451 per cent, the per capita installation now being four times as great as for the rest of the country. In the three years since 1912, in the West, primary installation has increased 47 per cent, or at the rate of 296,000 horsepower per year, of which three-fourths is waterpower, the additional annual installation being twice as great as for the five previous years.

Instead of stagnation, overdevelopment of power exists throughout these western States. Especially in California, Washington and Oregon installation is far in excess of demands. There is more developed power than can be disposed of, and the need is for more markets. Instructive figures are given showing that by contrast with municipal plants, private waterpower corporations are capitalized for at least twice the cost of development and that the so-called "cost" of these plants is, as usual, merely the "value as an investment" on the basis of probable income.

With reference to national forest lands, it is shown that out of 1,800,000 h.p. of waterpower alone, representing the development in 1915 in the West, 30 per cent is in plants located wholly or in part on National Forests, while an additional 12 per cent depend in part on National Forests for their storage reservoirs. Fourteen per cent are on other public lands. This makes a total (exclusive of plants touching national property by transmission lines alone) of 56 per cent of the total developed waterpowers of the West which has been installed under permits issued by the Forest Service or the Interior Department and in spite of these facts, we have heard reiterated claims that the present system of permits and regulations has made development impossible. In addition, there is under construction on National Forests, plants aggregating 123,000 h.p., while final permits are issued for 420,000 h.p. additional, and preliminary permits for 354,000 h.p., a total of 897,000 h.p., equalling 50 per cent of all waterpower now in use in the West. That this

increase of 50 per cent will actually take place *under present regulations* as rapidly as the market permits is clearly evident by the fact that no applicant can hold even a preliminary permit without an investment in surveys and plans and evidence of good faith, while for the final permits, construction must be commenced within a given time or the permit lapses.

The report, while indicating a rapid concentration of waterpowers in the hands of a few large companies, also indicates some of the reasons for this concentration. Fixed or permanent investment in waterpower is much greater than for steam power, and in 1912, only 24 per cent of the installation capacity was actually used or marketed, due to the necessity of providing for "peak" loads, maximum demands for service, and growth of service. "To secure advantages attendant upon diversity of demand is one of the chief reasons for joining many plants and many markets into one combined system." Public service corporations in 1915 owned 90 per cent of primary power in the western States as against 50 per cent in 1912. In the country at large 35 corporations control by direct ownership one-half the total public service powers and 6 corporations own over one-fourth of this total and in addition there is "a marked tendency towards association or community of interests, particularly between principal-holding companies that cannot be viewed without concern."

Perhaps the most significant fact brought out in this report is that 120 public service corporations out of 1,500 claim to own or control 3,683,000 horsepower undeveloped. This equals 80 per cent of the total waterpower developed and used in public service operations in the entire country. *No permit restrictions prevent the immediate development of this unused waterpower which is annually wasted.* Under government permits these waterpowers could not be held without development and use.

The report does not discuss waterpower legislation or existing policy and regulations, but the facts set forth cannot fail to remove many prejudices and enable Congress to approach the subject on a clearer basis.

NATIONAL CONSERVATION CONGRESS

THE National Conservation Congress has called a conference for the mobilization of America's resources for national defense to be held in Washington, D. C., May 2, 3 and 4. The conference is announced for the purpose of devising an answer to the following question:

"The world crisis has awakened the American people to the imperative need of immediate steps toward greater national strength and efficiency. The first step is the organization of the country's natural resources. Can the magnificent resources of the United States—men, industry, power, and the riches of the earth—be organized into a single co-ordinate unit that will be the sure defender of democracy in her hour of greatest peril and her greatest support in time of peace?"

The idea of the development of the country's resources will loom large, so the call for the conference states and it adds: "President Wilson has been advised of the plan and will be invited to speak on the subject. Foremost government and state experts in every line of industry and commerce are already at work with a view to laying before the conference, immediately on its assembling, the exact status of the country's resources and plans for their development and use with the idea of promoting the greatest possible national strength and efficiency.

"To the conference have been invited the Governors of the States, Senators and Representatives in Congress, members of the Cabinet, the Justices of the Supreme Court of the United States, the heads of State and government departments and bureaus, representatives of the leading organizations of the United States and experts, leaders of commerce and industry, transportation and labor, scientists, college presidents and noted men generally, whose expert ability in special lines of the country's resources is widely recognized.

"At the conclusion of the conference, it is hoped there will be ready to present to the President of the United States and to be given out to the country a practical plan for the mobilization of the country's resources for whatever purpose it may be desired. The conference will awaken a greater interest in America's resources and will instill a spirit of greater patriotism.

"The conference will continue three days. The first day will be devoted to topics tending to bring out the idea of a patriotism for national development. On the second day, will be taken up plans for the mobilization of the country's resources. Accurate data on the mobilization of resources from authoritative sources of the states and of the government and from outside experts will be presented and given to the public for the first time. On the third day, the conservation of human efficiency will be considered. Besides addresses by the leading men of state and nation, there will be reports from every section of the country relating to every phase of the national resources. A special feature will be addresses by prominent representatives of foreign countries, now naturalized Americans.

"At the evening sessions and other times, there will be illustrated lectures with thousands of feet of moving picture films, showing the development of the nation and also the possibility of its further development."

NORWEGIAN FORESTERS COMING

A DELEGATION of forestry experts from Norway is to spend six or eight months on the western coast of Canada and the United States this spring, obtaining information as to the various kinds of timber and pulp wood tree species growing on that part of this continent which are likely to prove suitable for plantation in western Norway. Western Norway is but sparsely forest covered and it is intended to replant it.

Wood Preserving Department

By E. A. STERLING

Ex-President American Wood Preservers Association

FOR the past year preliminary reports have indicated the successful development of improved methods of creosoting Douglas fir timber. Mr. O. P. M. Goss, engineer of the Association of Creosoting Companies of the Pacific Coast, who has been directing the investigations, presented a very interesting report at the meeting of the American Wood Preservers Association in January. The association he represents has now published a bulletin on "Creosoting Douglas Fir Bridge Stringers and Ties Without Loss of Strength." While the details may not be of interest to the readers of AMERICAN FORESTRY, the general results are important to any one in any way interested in the use of timber. The practice of creosoting Douglas fir has been followed on the Pacific Coast for approximately twenty-five years, but the boiling process which has been used has been rather severe, because of the resistance which fir offered to penetration by creosoting. This resulted in considerable loss of strength, which was not a desirable factor in structural timbers. The new method which has been developed consists in boiling under vacuum in order to reduce the high temperature previously necessary. Mr. Goss's bulletin outlines the detailed procedure, including strength and spike pulling tests. He summarized these conclusions before the Wood Preservers Association, as follows:

"The above results show conclusive proof that Douglas fir stringers can be effectively creosoted without injuring their strength, a fact which will be of interest particularly to railroads, and also to other consumers of structural timber."

ADDITIONAL data of great value on Douglas fir bridge stringers were presented by H. B. MacFarland, engineer of tests of the Santa Fe Railroad, in connection with the report of the committee on wood preservation of the American Railway Engineering Association, at its meeting in Chicago on March 21-23. Mr. MacFarland's tests are on the comparative strength of treated and untreated Douglas fir stringers in order to determine the effect of the treatment on the physical properties of the wood. This report is very complete, and fully illustrated by photographs of cross sections, and by curves and diagrams of each piece tested.

FURTHER evidence of the long life of creosoted material is hardly necessary; yet each year and each meeting of railroad wood preserving and engineering associations bring out new data. At the recent meeting of the American Railway Engineering Association, and at the January convention of the American

Wood Preservers Association, committees on service tests presented many records, among which was mentioned creosoted piling and timbers in coal docks of the Lehigh Valley Railroad at Perth Amboy, N. J., which were still in good condition after thirty years. Other complete records run back twenty-six years; while from other sources are data on creosoted piling which have resisted decay from marine bores for forty years in the Gulf of Mexico. Some later experimental test tracks are now giving results, cross ties from the Santa Fe Railroad, for example, being shown at Chicago in March, which were treated by the Reuping process with five pounds of oil per cubic foot in 1904, and are still entirely sound. The deduction is that timber well treated with a good grade of coal tar creosote will resist decay almost indefinitely. The same evidence, however, shows the necessity of proper protection from mechanical wear, since there are many records of ties and timbers which have failed because the protective treated portion was worn through, exposing the untreated center.

AT THE various lumber association meetings during the past winter exhibits have been shown which are of particular interest to the farmer and small consumer of creosoted wood. These included results from brush and open tank treatment of fence posts and small timbers, and included a model of an inexpensive open tank which any one can build for a few dollars. It was shown by actual specimens that posts of non-durable wood, for example, would decay in two to five years; whereas a brush and open tank treatment with creosote would preserve them for fifteen or twenty years, and in some cases more.

A NEW feature was added to the exhibit of the National Railway Appliances Association in Chicago in March, in connection with the annual Railway Association meeting, by the increased space taken by lumber manufacturers, and the very instructive demonstration which they arranged. In addition to many sections, diagrams and models of untreated timber, the results from proper treatment were also shown. There were, for example, well preserved sections of creosoted timbers taken from trestles of the New Orleans & North-eastern Division of the Queen & Crescent, and from the Louisville & Nashville, built in 1883. Samples of paving blocks were also shown which were laid in Galveston in 1875; while another part of the exhibit illustrated methods of preventing mechanical wear of cross ties by the use of screw spikes, large tie plates, dowels, etc., the possibilities of the dowels having been previously mentioned in this department.

Uses of Lumber

BY WARREN B. BULLOCK

ONE of the biggest educational movements in America today is the teaching of the man who uses wood, the proper use of lumber for structural work in the factory, house or farm building, or any of the thousand and one purposes for which wood may be used. Every part of the country is feeling the impetus of the new movement, fostered by the national manufacturers of all kinds of lumber, and spreading down through the wholesalers, jobbers and retailers to the every-day man on the job. Even the schools have taken up the movement. The organization by the University of Wisconsin of an extension course for users of lumber to teach the natural properties and best uses of wood, a course which has in its first year included hundreds of correspondence students all over the country, with sixty-three men in regular classes in Milwaukee, has spread to twelve other educational institutions, State universities, State colleges of agriculture, and private educational institutions. A dozen others will institute the course in another year, according to plans being made by various extension course leaders.

The theory back of the whole movement is that wood "the indispensable," is the best material for many kinds of construction work, and that the lumber industry should not try to force the use of lumber where it does not fully meet all requirements, but should concentrate its efforts on the education of the public to use wood where wood is best.

This national movement, backed by the trade extension department of the National Lumber Manufacturers Association, has its local manifestations in the Southern pine, and cypress men in the South, the Douglas fir and redwood men in the West, the hemlock manufacturers in Wisconsin, and so on all over the country, until the national movement has been taken up in a dozen ways by associations representing district or species, which first study the qualities of their own output and then prepare educational literature plans and specifications for the use of architects, engineers and consumers, to show where and for what purposes specific woods are the best.

There is no longer any excuse for the ignorant use of wood in any work, and any prejudice which may exist against the use of wood is due to lack of knowledge of how to build well with wood. Every one of a dozen or so organizations is ready to provide any builder with detailed general or technical information as to how best to use wood, and what woods to use for special purposes.

One of the great problems of the lumberman today is that of fire, not only the fires in the forest, but the fires in buildings, and there has been an enormous amount of work done throughout the country in studying the problem of how to build structures so as to minimize the danger of damage from fire. The whole question is be-

ing worked out on the basis of proper construction, adequate safeguards, elimination of hazardous contents and carelessness, and the use of automatic sprinklers. A great many reports on fire prevention and the use of structural material in buildings, state that a carefully designed timber structure is as safe against fire as any other type of structure if all floors are isolated, elevators and stairways enclosed in fireproof shafts with all openings protected by self-closing doors, and proper sprinkler systems used throughout. A heavy timber which has been charred by fire becomes of slow burning nature due to the charred coating, in the same manner that a solid log burns slowly.

This is only one of the phases of education being developed by engineers on behalf of the campaign for the use of wood where wood is best.

THE immense possibilities of developing southern pine and Douglas fir waste into wrapping paper have been reviewed for the members of the United States Senate Committee which has under discussion the proposal to increase the scope of the laboratory investigations, in the following memorandum on the production of Kraft wrapping paper from southern pine and Douglas fir, by Chief Forester Henry S. Graves:

"The waste incident to the production of southern pine lumber is of sufficient quantity to produce the enormous amount of approximately 20,000 tons of paper per day. Laboratory experiments have determined the suitability of this material for the manufacture of Kraft wrapping paper by the sulphate process and it now only remains to determine to what extent the laboratory results are applicable on a commercial basis.

"What has been said of the possibilities of southern pine is largely applicable to Douglas fir. While the Laboratory experiments with this species have not progressed to the same point as with the southern pine, the indications are that Douglas fir is also well adapted for production of Kraft paper and subsequent to the completion of the suggested work on pine, it would be my idea to utilize the experimental equipment secured for this purpose in similar work in the West with Douglas fir. Wrapping paper in this territory is at present secured from either western paper mills using sulphite pulp or from eastern and European mills supplying either sulphite or Kraft wrappings. In the latter case, it is of course necessary for the western consumer to pay freight charges amounting to about \$15 per ton. The Laboratory recently made paper of Douglas fir which tested a point to the pound, putting it in the class with the strongest wrapping papers made in the United States."

Brother Jonathan

BY CHARLES ALEXANDER RICHMOND

President of Union College

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I

Brother Jonathan sat by the kitchen fire,
Nursin' his foot on his knee.
"It's a turrible fight they're havin' out there,
But they can't git over to me."
And Jonathan jingled the coins in his han'
An' thanked the good God for the sea.

II

"They'll be wantin' my cattle and hogs and corn
An' powder and guns, mebbe,
But they'll pay on the nail! cash down, by gum!
For all they git from me."
An' he smiled kinder slow and jingled the coins;
"It's good for business," sez'ee.

III

"They're killin' 'em off like flies, they say.
They can't blame it onto me.
It ain't my war, yet I do feel bad
For them poor Belgiums," sez'ee.
And he took a few dollars out of his jeans
And sent it across the sea.

IV

Then he heard they'd drowned a thousand men,
And some from Amerikee.
So he said right out, "If you do that ag'in
You'll git me mad," sez'ee.
An' he kep' on jinglin' the coins in his han'
An' thankin' God for the sea.

V

They did it ag'in and then ag'in.
"You quit that now," sez'ee.
"I'll give you fellers a piece o' my mind
If I git hol' o' ye."
An' he winks one eye with his tongue in his cheek;
"I'm too proud to fight," sez'ee.

VI

Then they got to plottin' and blowin' up things,
An' he sez: "You let me be.
I won't stand these furrin tricks o' yourn
In this here land o' the free."
And it got old Jonathan all het up,
An' he took his foot from his knee.

VII

An' he got to thinkin' and thinkin' hard,
Worryin' how it would be,
An' wonderin' what in Sam Hill he'd do
If some pesky enemy
With all them dreadnoughts and submarines
Came a-rippin' across the sea.

VIII

An' he thought of the army he wished he had,
An' he reckoned up his navy.
"I guess I've set here long enough;
I'll have to get busy," sez'ee.
But the last I saw he was a-settin' there yit
An' strokin' his long goatee.

IX

It ain't no time to be settin' 'round,
I kin tell ye—no sirree.
He better be gittin' up and out o' that cheer
An' git outdoors and see,
An' do his chores and fix things up
The way they oughter be.

X

He might be helpin' them cousins o' his'n
To fight fer liberty,
An' he might git in a few licks hisself
Jes' fer humanity.
Anyhow, I wish he'd quit jinglin' them coins
An' thankin' God fer the sea.

MORE LAND FOR NATIONAL FORESTS

THE National Forest Reservation Commission has approved the purchase by the Government of 47,600 acres of land, comprising sixty-one tracts in the Appalachian and White Mountains. Approximately 25,000 acres of this lies in the western part of Maine, contiguous to the Government's previous purchases in New Hampshire, and is the first land to be acquired in the State of Maine for National Forest purposes. More than 300,000 acres have now been acquired in the White Mountains in New Hampshire and Maine, the area acquired and approved for purchase being almost one-half of the total area which it is expected that the Government will acquire in the principal White Mountain region.

Additional tracts were also acquired in the Southern Appalachian States. In Macon and McDowell Counties, North Carolina, a number of small tracts were acquired which together comprise 2,060 acres. In Virginia, the purchases were mostly in Shenandoah, Amherst, Augusta and Rockbridge Counties, where additional acreage amounting to 7,300 acres was acquired. Some 3,000 acres of the new lands are situated in Polk, Carter and Unicoi Counties, Tennessee, while in Rabun and Fannin Counties, Georgia, about 1,100 acres were acquired and, in Oconee County, South Carolina, 300 acres.

Unless provision is made by this Congress for additional funds the work of purchasing additional areas cannot be continued. In order to keep the machinery intact and to make reasonable progress it is essential that at least one million dollars be available for the fiscal year 1917, and two million dollars for the fiscal year 1918. It is understood that proposals have been made in the Senate to include an item appropriating these sums in the agricultural appropriation act for the fiscal year 1917 when it is under consideration by that body.

CORRESPONDENCE COURSE IN FORESTRY

ONE of the methods used by State Agricultural Colleges for carrying information to the people is the correspondence course. By many it is considered one of the most effective employed. Thousands of people are reached every year in this way. These courses cover a wide range of subjects relating to agriculture. They are written in a simple manner and frequently revised in order that they will contain the latest ideas and information on each subject. The object in issuing information in this way rather than in bulletin form is to make sure that the information sent is carefully read. The correspondence courses are divided into short lessons, each covering a particular subject or problem. Together with each lesson is sent a question paper relating to the text. To answer these questions it is necessary that the text be carefully read. The next lesson in a course is not sent until the questions relating to the previous lesson are answered satisfactorily and returned to the college.

In the fall of 1914 a correspondence course in Farm Forestry was issued by the Pennsylvania State College. It has proven one of the most popular courses issued. The first edition of five hundred copies was exhausted within a year. It showed that farmers are interested in the care of their woodlots and eager to secure knowledge as to how woodlots can best be managed. Some of the subjects discussed in the different lessons are:

The tree, its parts and their uses, the factors influencing the life of trees, starting a woodlot from seed or by planting, how to care for a forest plantation, managing the ordinary farm woodlot, woodlot protection, and estimating the woodlot for lumber and cordwood.

Many of the questions asked in the lessons refer directly to the farm woodlot itself, making it necessary in answering them to visit a woodlot for observation or for taking measurements. Those taking the course in farm forestry are encouraged and urged to ask questions in return, relating to the particular problems they find in their own woodlot.

FOREST CLUBS MEET

THE second annual meeting of the Intercollegiate Association of Forestry Clubs was held at Ann Arbor, Mich., recently. The association was formed at Ithaca, N. Y., in 1914, at the time of the conference of forestry schools held in connection with the dedication of the new forestry building, the object of the association being to create interest in scientific forestry and to promote good fellowship among the forestry students at different schools.

At the meeting held this year the delegates met in business session and were entertained at a banquet given in their honor by the Forestry Club of the University of Michigan. Included in the business transacted was a complete revision of the preliminary constitution drawn

up at Ithaca, N. Y., in 1914, and the election of the president school for the ensuing year. The University of Washington was chosen as president school to succeed Cornell University.

The Forestry Clubs of the following universities were represented by delegates at the meeting: Cornell University, president school, M. B. Haman; University of California, A. E. Wieslander; Michigan Agricultural College, E. Hamlin; University of Michigan, O. L. Lovejoy; Ohio State University, J. D. Sayre; Syracuse University, J. I. Neasmith; University of Washington, D. H. Clark; Yale University, G. H. Lentz. The Universities of Idaho and Montana were represented by proxy.

The phrase "of United States" was struck out because the clubs of forestry schools in Canada have been invited to join the association.

IN CHARGE OF YOSEMITE

SECRETARY LANE has announced the appointment of Washington B. Lewis as supervisor of the Yosemite National Park, California. Mr. Lewis graduated from the Engineering Department of the University of Michigan in 1907 and since that time has been a member of the United States Geological Survey. During the past nine years, in addition to work done in several of the Western States, he was furloughed for survey work with the First and Second National Geographic Society expeditions to Alaska, and, in 1911, went to Argentina where he was engaged for four years in making studies and surveys in connection with the investigation of the industrial possibilities of northern Patagonia for the government of Argentina.

Mr. Lewis is an associate member of the American Society of Civil Engineers and a member of the Cosmos Club of Washington, D. C.

CHANGES AT WYMAN'S SCHOOL

WYMAN'S School of the Woods at Munising, Michigan, has filled the vacancy in its teaching staff by the appointment of Raymond J. Guyer, a graduate of Pennsylvania State College, and by the further addition of R. R. Fenska, who finished at Yale. Some few changes have been made in the course to bring about even greater practical training. The school will continue to place Forest Engineering and Logging and Milling in the lead with the technical forestry subjects and constant practical demonstration and work as a filler for the two practical subjects.

BIRD AND TREE BOOKS FREE

Members have an unusual opportunity to acquire valuable bird and tree books without any charge. All that it is necessary to do is to secure one new subscribing member. See the announcement at the bottom of the table of contents on the first page of this issue.

Editorial

AGRICULTURAL COMMITTEE'S SURPRISING ACTION

THE Agricultural Committee of the House of Representatives, by a vote of eight to seven, struck out of the appropriation bill the sum of \$3,000,000 for continuing the work of land purchases under the Weeks Law. If this action stands, the policy of acquisition of mountainous area in the Appalachians and White Mountains by the National Government will come to an abrupt termination, and the government will be left with the nucleus of seventeen administrative areas, each requiring supervision and protection, but none large enough to effectively accomplish the purposes for which they were intended.

This action is the more surprising when it is known that this sum represents the amount previously appropriated by Congress, but which lapsed by time limitation because the Government refused to be hurried into unwise or ill-considered purchases previous to creating the proper machinery for appraisal and the perfection of titles.

Congress cannot plead failure for this work as a reason for its discontinuance. At the recent hearing before the Agricultural Committee all sections were represented here, and the demand for its continuance was unanimous. No breath of criticism attaches to the purchases. The areas already acquired, totalling 404,984 acres, though scattered and small, have been wisely grouped in definite districts in which it will be possible with continued appropriations to secure tracts large enough to permit of economical and effective fire protection. Already these tracts have been brought under control, fires stopped, trails, lookouts and telephones installed and the mountaineers educated to a new attitude towards the care of the

forests. 874,498 acres have been approved for purchase and if secured would make the total acquired 1,279,482 acres. This work, pushed forward, means the regeneration of vast areas, not merely through forest restoration, but by a distinct uplift in social conditions as well. The physical benefits will not be confined to the mountain counties within which the lands lie, but by effective watershed protection stream flow will be regulated, power sites will increase in value, navigation will be protected, erosion and silting up of streams retarded or prevented and the entire economic life of the States affected will be permanently bettered.

There is yet time to save this appropriation. Senator Gallinger has introduced in the Senate an amendment to the Agricultural Appropriation bill. This amendment was referred to the Committee on Agriculture and Forestry, Senator Gore, chairman. It is hoped this committee will report favorably on the amendment and that it will be adopted by the Senate. If it is it will go to conferees of the Senate and the House and will finally get back into the House for a vote.

It is essential that every Senator be petitioned to give the amendment his consideration and approval. The American Forestry Association has already requested such consideration from each one. Members of the Association are now asked to personally write to each Senator and each Representative from their district urging support of the measure. Such personal letters will have considerable weight and will be invaluable in the effort to secure the appropriation.

Please write now.

Waterpower Legislation

By H. H. CHAPMAN

THE development of public utilities in this country is largely in private hands, as contrasted with almost universal public ownership in Europe. In its initial stages of development, American communities were more keenly alive to the benefits of these enterprises than to the rights inherent in the public. The ground lost by perpetual franchises and other onerous conditions, often obtained by bribery, is only recently being partially recovered by means of limited franchises, profit sharing and the right of recapture and public operation at expiration of leases.

The prolonged agitation over waterpower legislation is explained by the development of waterpower, through

long-distance transmission, as a public utility of the first magnitude, furnishing power, not only to public service corporations engaged in transportation, lighting and heating, but to the manufacturing industries and even promising to invade the homes as a substitute for fuel. Railroads in mountain districts may in the near future be operated entirely by electricity. The enormous importance of this development of waterpower as a public utility cannot be minimized.

Waterpower development tends naturally towards monopolistic control. A power site is capable of development by but one corporation. Immense sums are required for long periods to install the dams, power plants and

distributing systems, and to create and maintain a profitable and economically administered power business. The consolidation of many waterpower sites in a few strong hands cannot be successfully prevented, any more than that of the development of large and efficient railroad systems.

But this very tendency carries with it, as in all other instances of monopoly, the danger that the public may eventually be forced to pay tribute by overcharges for services which have become indispensable. The specific means by which this might occur are monopolistic control of all available waterpower sites, with the ability to limit developments and raise rates; and the inflation of the capitalized value of the corporation's business by which the per cent earned upon the watered capital ceases to indicate the returns upon the capital actually invested. The legality of inflated values is accomplished through sales, and consolidations or reorganizations by which the plants are actually transferred at the advanced values, which then become the basis for rate charges.

Short of enforcing competition, which is not always economically sound, the public can protect itself in three ways—by the regulation of rates, based on fair earnings; by restricting overcapitalization, and by preventing the monopoly of the natural resource, making development a condition of control.

Good waterpower legislation must make possible the *development* of publicly-owned power sites, but must rigidly prevent the acquisition of rights under leases which do not require development. If market conditions do not demand the use of a waterpower, control of the site should remain in public hands for the present. The public must not be left with the husk of ownership, similar, for instance, to that possessed under 999-year leases. The right of recapture of these sites must be protected, and the terms must be such as to exclude the value of the rights granted and of public property or land used, as well as intangible values based on income. The principle should be to return to the lessee his actual capital investment, but not to sanction the very process of inflation of values which it is the principal object of public ownership to prevent. This same inflation should be checked by power to withhold consent to sales or transfer of lease, except upon terms approved by the public official responsible for the administration. The above objects may be best attained through the retention of practical or actual public ownership of waterpower sites.

The third object, regulation of rates charged for services, may be exercised by States or for interstate business by the national government. This power alone forms an entirely inadequate control of the situation, since it does not prevent inflation nor require development, as indicated by the government report reviewed on page 236 of this issue.

The Ferris Waterpower Bill, as passed by the House of Representatives, provided adequate measures for development of waterpower sites on public lands under proper control. As amended by the Senate, this bill

1. Permits the acquisition of leases controlling unlimited waterpower sites by the same corporation without requiring prompt development.

2. Prevents States, municipalities or other public bodies acquiring these sites, even at the expiration of the lease, unless at the option of the lessee.

3. Permits inflation of capital by removing all control over transfer of leases, and failing to properly safeguard the provisions of recapture.

These alterations work, in effect, to rob the public of the substance of ownership and to make the lessee to all intents and purposes the owner. This course is justified by its advocates on the ground that capital requires these guarantees as a condition making possible the financing of the projects. But the statistics of actual development cited on page 236 show that under present regulations, which grant none of these "rights of ownership," 56 per cent of *all* western waterpowers are now being operated, with an equal amount in process of development or under application.

This means that the financial interests which are at present capable of developing public waterpower sites are also capable of operating under the conditions now imposed, and which thoroughly protect the public at all points. Unless the amended Ferris Bill sanctions regulations equally efficient, it should be summarily disposed of. In its present form it is unfit for passage.

The bill contains two further features, both objectionable. In the interest of an organization of promoters, it would sanction a commercial power site in the Grand Canyon of Arizona, known as one of the wonders of the world. As well permit the harnessing of the geysers in Yellowstone Park. The second feature, which we are at a loss to account for, is the provision transferring the administration of the waterpower sites situated within National Forests from the Forest Service to the Secretary of the Interior. The entire policy of leasing and use of waterpower had its origin and was developed to an efficient practice in the Forest Service.

Three-fourths of all the waterpowers in use on public lands are now handled by Forest Service officials, and a still larger percentage of the unused power lies within these national forests. These sites are situated hundreds of miles from any existing Interior Department lands or officials. Expensive and useless duplication of work would result—with no attendant benefits. Any such wholesale transfers must be justified either on the grounds of incompetency of existing service, or a large resultant saving and increased efficiency. This feature of the Ferris Bill is absolutely unjustified by existing conditions.

EXHIBITS WIN DIPLOMA

EXHIBITS sent to the Panama-Pacific Exposition, at San Francisco, by the State College of Forestry, Syracuse University, have been returned to the college and are being unpacked. The models, showing the practical work done at the college, won a diploma.

Canadian Department

BY ELLWOOD WILSON

Secretary Canadian Society of Forest Engineers

P. Z. Caverhill, Director of Forest Survey of the Province of New Brunswick, has commenced his important work of mapping and estimating the timber lands of that Province. Mr. Caverhill is attacking this problem in a very practical and thorough manner and his results will be looked forward to with much interest.

The Canadian Forestry Association has brought out a very well gotten up "Boy Scouts' Book" which gives information about the forests, their use and protection, which every boy should know, and is now engaged in drawing up a set of examination questions which will entitle a scout, after answering them successfully, to his "Forest Badge."

J. F. L. Hughes, a student member of the Canadian Society of Forest Engineers, and formerly with the Laurentide Company, has been taking a course in aviation and is now on his way to England to continue his training.

A letter recently received from Mr. Stuart, formerly with the Laurentide Company, says that he has been eleven months in the trenches near Ypres after spending some time at Shornecliffe. He says the mud is terrible, but that otherwise there is less hardship in the trenches than on a forestry survey in the Canadian woods. He is one of five sergeants left out of an original sixty.

George H. Mead, of Dayton, Ohio, has been elected President of the Spanish River Pulp and Paper Company.

Letters recently received from foresters in Spain and Sweden complain that American writers do not use the scientific names of trees and plants, but only the common names, which are of course unintelligible to them. The scientific names should be used much more freely than they are at present.

The Commission of Conservation has just issued a book, "Altitudes in Canada," compiled by Mr. James White, which gives the altitudes above sea level of all the most important places in the Dominion. This represents a large amount of work, and Mr. White is to be congratulated on preparing a work which will be very useful.

The annual meeting and banquet of the St. Maurice Forest Protective Association was held at the Place Viger Hotel, Montreal, recently. This was a very successful meeting and the Association showed that it had progressed during the past year.

An appropriation was made for building telephone lines to connect some of the lookout towers erected last year and to make other permanent improvements. A committee was appointed to draw up a form of order to be issued by all the members to their foremen in charge of woods operations, giving them instructions about fighting fires, reporting them, guarding against fires set by smokers and smudges and by men coming into and going out of the forest. The following officers were elected: President, Ellwood Wilson, Laurentide Company, Ltd.; vice-president, R. E. Grant, St. Maurice Lumber Company; Henry Sorgius, manager and secretary.

The annual meeting of the Canadian Pulp and Paper Association was held at the Ritz-Carlton Hotel in Montreal and was a great success. The paper business was reported to be in a flourishing condition and everyone was pleased with what had been accomplished through cooperation. Mr. J. H. A. Acer, of the Laurentide Company, Ltd., was elected president. The technical section meeting was very interesting, one of the papers on welfare work among mill employees being especially so.

The Canadian Pacific Railway will begin the planting of trees along their eastern lines to take the place of the snow fences at present in use. This has already been done on western lines with success.

The Geo. A. Fuller Co., Ltd., of Montreal, have obtained a contract to build three mills for the St. Maurice Paper Company, Ltd., at Cap Magdalaine, Que. This company is a subsidiary of the Union Bag and Paper Company, of Hudson Falls, N. Y.

The Crown Lands Department, of Nova Scotia, reports about 13,000 acres burned over during the season of 1915.

An article published in the *Canadian Pulp and Paper Magazine* of March 1, written by Mr. R. H. McKee, head of the Pulp & Paper School, of the University of Maine, about the possibility of obtaining hybrid poplar trees which will grow very much faster than the present species, opens up a most interesting field for experiment. If hybrid trees can be obtained which will produce pulp wood in ten to twenty years the industry would be placed on a new and absolutely firm basis, with raw material which would be much cheaper, and which, being produced right at the mills, would greatly reduce the present cost of transportation. It is hoped that experiments along this line will be undertaken at once.

The bill to amend the forest fire laws of Quebec has passed third reading.

The annual meeting of Mountain Lumbermen was held at Nelson, B. C., and reports showed that the outlook was better than for some years. Mr. C. D. McNab, was elected president; Mr. A. J. Lammars, vice-president, and Mr. I. R. Poole, secretary-treasurer.

Lieut. Jos. Power, son of Mr. Wm. Power, past president of the Canadian Forestry Association, has returned from nine months spent in the trenches in Flanders, with nerves shattered. He spent two months in the hospital in London and has two months leave. His brother, Lieut. Charles Power, is in hospital with eighteen shrapnel wounds.

The report of the Conservation Commission, "Forest Protection in Canada, 1913-14," has just been issued and is a very interesting volume.

The 215-foot flag pole made of Douglas fir, *Pseudotsuga mucronata*, Sudw., recently shipped from British Columbia to Kew Gardens, London, Eng., arrived safely. A London dispatch, referring to its arrival, says: "Once the pride of a British Columbia forest, a 215-foot flag staff now lies in the Thames off Kew Gardens." The clerk at Kew wrote out a receipt for 215 feet of flag pole, on a two-inch piece of paper: "Received in good condition, one log." The adventures of the pole are by no means at an end. The Garden authorities are now faced with the big task of raising it across the moat which bounds the river front of the Gardens and then dragging it a quarter of a mile to the mound where the old pole stood for so many years.

The Lower Ottawa Forest Protective Association increased its area by 944,640 acres during 1915 and now patrols 8,504,320 acres. 155 fires were extinguished, and of these 113 were put out without extra labor by the ranger. 322 permits were issued for burning slashings, and these fires were supervised by the rangers.

Timber is becoming so scarce in England and high freights and scarcity of ships have rendered the situation so acute, that the War Office has asked the Canadian Government to enlist a battalion of woodsmen to cut timber in England. Recruiting will start at once. Lt. Col. Alex. McDougall, of Ottawa, will be in command.

Mr. J. B. Tyrrell, F. G. S., has written, for the February number of the *Canadian Forestry Journal*, a very interesting account of the District of Paricia, a section of 150,000 square miles to the northwest of the Province of Ontario which has just been given to that Province by the Dominion Government. It has a population of 3,000 Indians, nine whites, and will cut about two cords of wood per acre.

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ratus. This special creosote is called *Barrett's Grade One Liquid Creosote Oil*.

With Grade One Creosote, successful creosoting can be done by the lumber dealer or by the actual lumber consumer, the farmer, the builder, etc. All that is required is an inexpensive tank large enough to hold the timbers, with provision for heating the oil. Grade One Oil applied with a brush will also give effective results. Timber that has been treated in this manner will have its life doubled or trebled when put in service.

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Percy Burchill, of Nelson, N. B., a member of the lumbering firm of Burchill & Son, and a graduate in forestry of the class of 1910, U. N. B., was married on January 26, at St. John, N. B., to Miss Gene Garden, a graduate of the same institution.

B. M. Winegar, of the C. P. R. Forestry staff, was in Fredericton on March 2, having a conference regarding fire patrol on their lines with Colonel Loggie, provincial forester, P. Z. Caverhill, and John McGibbon, chief fire warden for New Brunswick.

As part of the spring field work along construction lines, it is proposed to build a telephone line to the camp, a distance of about three miles, and also to construct some trails and possibly some lookout stations on the college lands. Besides giving the students some very practical experience, the proposed improvements will have considerable value in fire protection.

W. W. Gleason, formerly with Wyman's School of the Woods, Munising, Mich., is now a special agent for the St. George Pulp and Paper Company, at St. George, N. B.

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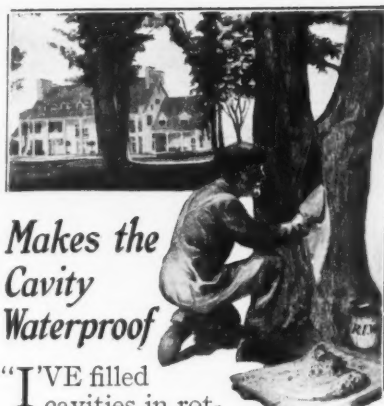
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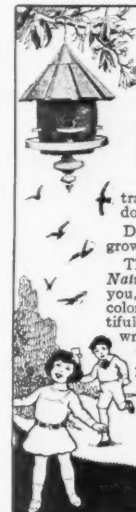
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White fir.....	950,000	" "
Noble fir.....	900,000	" "

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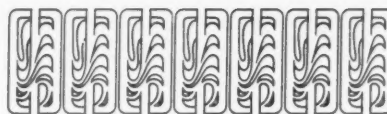
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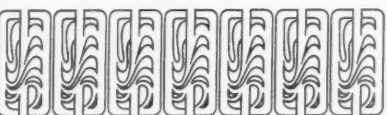
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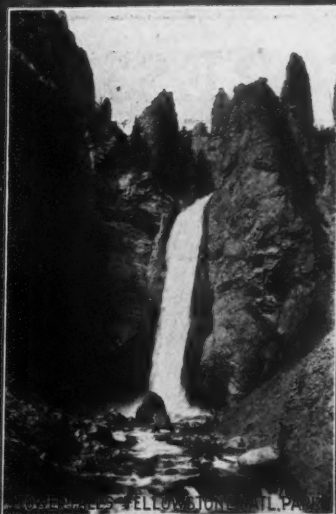
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